INTERTYPE

THE INTERTYPE

STANDARDIZED INTERTYPE

WITH EQUIPMENT

E 3—4 S. M.

THE INTERTYPE

ITS FUNCTION, CARE, OPERATION AND ADJUSTMENT

Edited by

MacD. Sinclair

With the Collaboration of the
Engineering Staff of the
Intertype Corporation

Price $10.00

Brooklyn, N. Y.
Intertype Corporation
1929

Printed in U. S. A.

Foreword

While the Intertype is the simplest line-casting machine in the world, its mechanism is not without complications, and the average printer has need of an instruction book written in plain manner which will inform him of the workings of the machine, the routine acts necessary to keep it in good running order and simple instructions for the attention to various parts needing occasional replacement or repair.

The Intertype Corporation, therefore, desiring to be of greatest possible service to all co-laborers in the field of the Graphic Arts, has brought out this book by MacD. Sinclair, whose long experience as a composing machine engineer and as a writer in the composing machine field guarantees the high standard of the work. Mr. Sinclair has had the collaboration of the engineering staff of the Intertype Corporation throughout the preparation of the book.

This book contains information relative to the difficulties that may arise in the course of the day's work. All of these troubles are not, by any means, common to every machine, but through an operator's inexperience or neglect of the ordinary maintenance requirements, some of those mentioned may occur. The great majority of the troubles enumerated may never occur on an indi-

vidual machine, but it is deemed best to cover the list as far as possible because of the fact that Intertype machines are now in daily use in practically every country throughout the world.

The subject matter contained herein has been written primarily for the mechanically unskilled operator and machinist. Those who have had some experience in the field may note herein many methods which will appear so simple as to need no explanation. We strongly urge, however, careful consideration of these methods by experienced operators and machinists with a view towards improving maintenance practices. We feel that users of Intertype equipment will be benefited by a careful study of this book.

Painstaking watchfulness has been exercised by those collaborating in the production of this book. However, we fully realize that in such a highly technical work as this, some unintentional errors may creep in. With a view to a later and even better edition at some future time, we shall be pleased to receive constructive criticism of the present effort.

INTERTYPE CORPORATION
Brooklyn, New York

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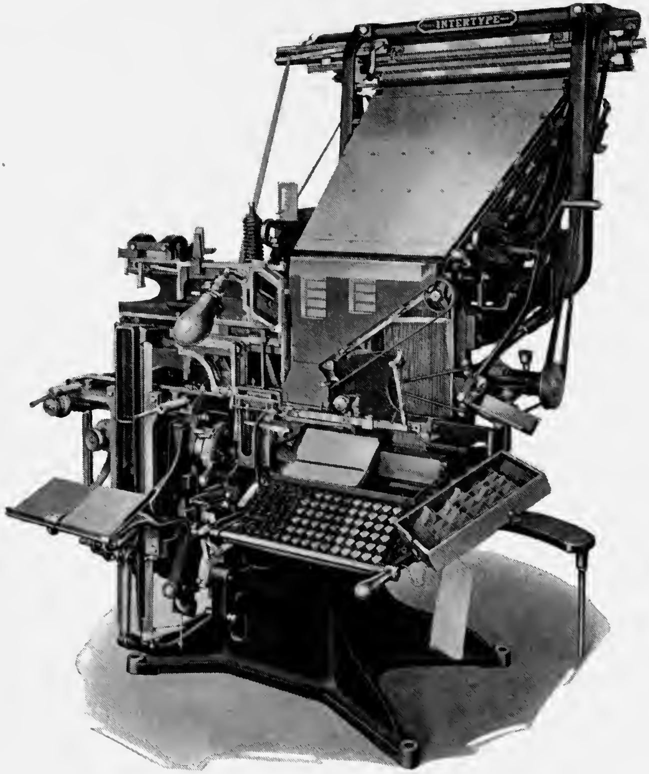
Classification

For convenience of explanation, the structure of the Intertype machine may be divided into three distinct mechanisms, each of which may be driven and operated, to a certain extent, alone; but all three are needed to complete the continuous work of type composition. The functions of each of these main mechanisms are combined and correlated by subordinate connecting mechanisms to form one complete operating unit.

The three main mechanisms are ASSEMBLING, CASTING, and DISTRIBUTING. This method of division will be followed here in explaining the mechanical construction and operation of the machine.

To describe the machine from the viewpoint of typographical requirements, it will be considered as built up of standard units or equipments designed to suit the requirements of the composing room. These units, it should be understood, may be expanded or altered to suit changes in such requirements as they arise.



STANDARDIZED INTERTYPE
WITH EQUIPMENT C

Chapter I

HOW THE INTERTYPE OPERATES

In its essential features the Intertype resembles the machine invented by Ottmar Mergenthaler. It casts slugs or lines of type, instead of individual types such as are used for hand composition.

In addition to the regular keyboard layout, the Intertype keyboard can be arranged for all kinds of straight matter, head letter, advertising figure, foreign language, rule form and other special composition.

As the operator depresses the keys on the keyboard, brass matrices are released from a magazine and fall down to an assembling elevator in front of the operator. The purpose of the assembling elevator is to assemble the matrices in a line, preparatory to casting the slug or line of type.

Most two-letter matrices from 5 to 14 point have two characters punched in one edge of each matrix; for instance, a roman lower case "a" and an italic lower case "a," or a roman "a" and a bold face "a." The reason for having two faces on one matrix is that nearly all kinds of composition frequently requires both roman and italic, or roman and bold face, in the same line; also it is convenient to have the italic and bold face for use as head lines, running heads, etc.

The matrices can be assembled to cast all roman or all italic (or bold face). Words or lines to be cast in italic or bold face are simply raised to the upper position in the assembling elevator. The roman face is always punched in the regular or lower position, with the italic or bold face in the upper or auxiliary position.

The magazines can be filled with two-letter matrices containing either roman and italic characters or roman and bold face characters, but it is not feasible to have all three faces (roman, italic, and bold) on one matrix. Most composition requiring three kinds of letters is taken care of by using an Intertype Mixer machine, or an Equipment C-s.m. 2.

The majority of roman with italic fonts also carry small caps, these being placed on the figure matrices and less used characters, in place of italic figures, which are seldom used. The italic figures, however, pass into what is called a pi stacker and are inserted in the lines by hand.

The manner in which the machine releases the matrices from the magazine should be carefully noted. Directly behind the keyboard proper there are two rows of eccentric cams—one cam for each keybutton on the keyboard. When the keys on the keyboard are touched by the operator, these cams drop down upon a revolving rubber roll. The cams are turned once around by the rubber roll, and this motion, owing to the eccentric shape of the cams, gives the yokes supporting them a quick upward thrust, this up-

ward thrust being transferred by a series of keyboard key rods to the escapements, releasing the matrices from the magazine. The escapements, as used on the Intertype, are very simple in design and operation, being made in one piece, and are actuated by such direct mechanical means as will insure instantaneous response to manipulation of the keyboard.

The matrices are stored in the magazine by engagement of their projecting lugs which fit into grooves in the magazine, and are supported in long rows, end to end, each row including all the matrices of one letter as "a," "e," etc. There are twenty matrices each of such frequently used letters as "e," "t," "a," etc., and fewer of letters used less often, such as capital "X," "Z," etc. A large font (lower case, caps, figures, etc.) contains 1500 matrices, consisting of about one hundred different letters or characters; each matrix bearing two separate faces, roman and bold face, or roman and italic.

As the matrices are released from the magazine by the operation of the keyboard they drop down upon a rapidly moving belt which carries them to the assembler, where, as previously explained, they are assembled in a line ready for casting the slug.

When the operator has filled out the line in the assembling elevator with matrices, he raises the assembling elevator, bearing the line of matrices by means of a lever to a delivery slide which conveys the line to the casting mechanism. The slide then returns to normal position ready to receive another line for delivery to the casting mechanism. Meanwhile the operator starts to set his next line, the line just sent in being automatically handled by the machine from this point on in the manner described below.

The delivery slide conveys the line of matrices into the jaws of an elevator, which is immediately lowered, carrying the matrix line to a position in front of the mold in which the slug is to be cast.

The mold contains a cavity of the size and shape of the desired slug. The back of this cavity aligns with a passage leading from the metal pot, filled with molten metal. The elevator bearing the line of matrices presents to the front of the mold cavity that part of the line in which the letters are punched. The mold is now caused to advance against the matrix line, and the metal pot, which also moves slightly forward, is locked against the rear of the mold. Immediately following the locking of the metal pot against the back of the mold, the pot pump is caused to force molten metal into the mold cavity, casting a slug, the top edge of which bears letters as they are arranged in the line of matrices.

In order to clearly understand how the casting operation is accomplished it is necessary to go back for a moment to the composing of the line in the assembling elevator. In addition to touching the various keys on the keyboard, as required by the copy, the operator also touches a special spaceband key after each word, so as to drop the spacebands into the line from the spaceband box directly above the assembling elevator. Spacebands are used to separate the groups of matrices which form the words and at the same

time form a means of expanding or justifying matrix lines so they will all be of even length. A spaceband consists of a short sleeve and a long wedge, the outer sides of which are parallel; the inner surfaces of the sleeve and the long wedge are tapered. When the line of matrices passes from the assembling elevator to the casting mechanism the spacebands are carried with it and the short wedges or sleeves of the spacebands which are shaped similar to matrices, fit in between the word groups while the long wedges of the spacebands extend below the matrix line about two inches.

Just before the slug is cast, justification of the line is accomplished by means of a bar actuated by two levers which pushes upward against these wedges, spreading out the space between each word in the line an equal amount. If there are so few matrices in the line that the spacebands cannot fill it, a safety device automatically prevents the metal from being pumped into the mold and no cast occurs. In such a case a bell rings and the operator knows that he must reset the line and put more matrices in it.

After the slug is cast, the circular disk which carries the molds is turned three-quarters of a revolution, carrying the slug (still in the mold) with it. On the way around the bottom of the slug is trimmed by a knife positioned behind the mold disk. When the mold disk stops an ejector blade comes forward from behind it and pushes the slug out of the mold and into a galley at the left of the operator. As the slug is ejected from the mold it passes between two parallel trimming knives, which trim it on both sides.

In the meantime, while the slug is being trimmed and ejected, the line of matrices from which it was cast, is transferred to the top of the magazine from which the matrices were originally released, and each matrix drops into its proper channel in the magazine. The method of accomplishing this distribution is ingenious. First of all, after the slug is cast, the first elevator which held the line of matrices against the mold, rises to a transfer channel and a long arm which swings down from the top of the machine comes to rest upon the transfer channel. The matrix line is now transferred from the first elevator to the second elevator.

The second elevator, supporting the matrices by their teeth on a V-shaped bar, lifts them to a distributor box at the top of the machine. The matrices are caused to pass out of this box one by one, and are conveyed along a distributor bar which extends across the top of the magazine by long revolving screws positioned parallel to the bar, three of the lugs of each matrix (two upper and one lower lug) engage the threads of the revolving distributor screws. The bottom of the distributor bar is V-shaped and the matrices are propelled along it supported by their teeth. When a given matrix reaches a point directly above its channel in the magazine, there is a break in the teeth cut in the distributor bar corresponding to the combination of teeth cut in the matrix. The matrix is released and drops into its proper channel in the magazine. The combinations of teeth are, of course, different for every character in the font; and the teeth in the V-shaped bottom of the distributor bar

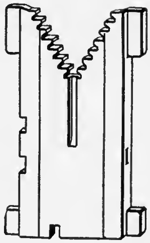
are cut to correspond. In the meantime the spacebands, not having any combination teeth like the matrices, remain in the transfer channel and while the matrices are lifted up to the distributor, the spacebands are returned to the spaceband box at the right of the transfer channel.

It must be remembered that the operations just described (the casting of the slug and distribution of the matrices) are entirely automatic. The operator does nothing but manipulate the keys and, at the end of each line, raises the assembling elevator to deliver the line of matrices to the casting mechanism.

Chapter II

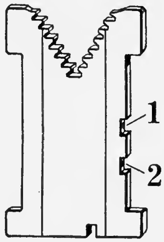
THE ANATOMY OF AN INTERTYPE MATRIX

It is essential that all parts of an Intertype matrix be understood in order to comprehend the matter contained in this book. References are made throughout the text to the various parts of the matrix, according to the machine part which is being described and with which the matrix works. For that reason the following descriptions should be carefully studied.

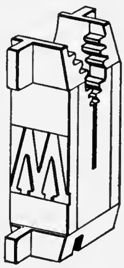


A

A. The matrix, generally speaking, is made in the shape of a rectangle, with oblong indentations at front and back, due to the projecting lugs, of which there are four. A triangular tooth recess indents the top section of the body between the two ears. The length is one and one-quarter inches; the width across the lugs, upper and lower, is three-quarters of an inch; the width across the body from the reference character to casting character is nine-sixteenths of an inch. The lower lugs or toes are one-eighth inch long and the upper lugs or ears are .266″ long. Lugs are put on a matrix to guide and support it in its travels through the machine, and the lower back toe under the matrix cell is used to align the letter characters in a groove at the front of the mold. When the matrix body is thicker than the lugs, the lugs are always placed at the right side when the reference characters are toward you. The body of a matrix is that portion between the lugs. The thickness of a matrix depends entirely upon the width of the character punched in the casting edge, which is about .00025″ thicker than the reference edge, in order to provide a tight seal in the vise jaws so that no metal can enter between the letters. The central portion of the matrix body is relieved, that is, thinner than the outside body edges, to the extent of .005″ on each side, to further insure tight lockup of the edges during justification.

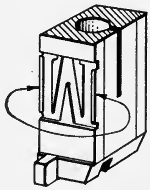


B

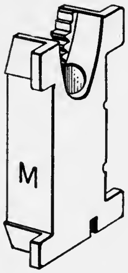


C

B. Matrices from 5 to 14 point having a single letter character punched in the casting edge, are called one-letter matrices. The letter character is usually punched in the position indicated by the arrow *1*. Matrices from 5 to 14 point having two characters punched in their casting edges are



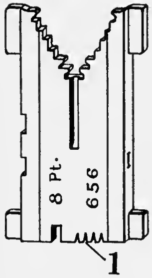
D



E

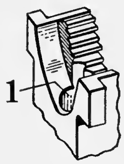
called two-letter matrices. No. *1* represents the normal position or punching of the matrix character, and No. *2* represents the auxiliary position or punching of the matrix character. All matrices from 18 point to 60 point (condensed) have one character. These are known as head letter or display matrices and are usually punched in the auxiliary position. The character punchings on all matrices are .043″ in depth.

C. The lugs of this matrix are set away from the edge of the body. This is called a back-milled matrix. The object in placing the lugs in this manner is to position the matrix body in the magazine so that it will not interfere with matrices in an adjacent channel. Back-milling is only done in certain cases where larger sized matrices are intended to run in the lower case or figure-and-point channels of a magazine.



F

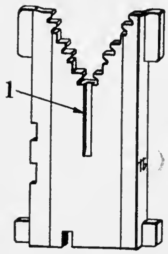
D. This illustration represents a view of the matrix side walls. In some matrices these side walls are very thin, being only a few thousandths of an inch thick. One of the principal reasons for polishing spacebands every eight hours is to prevent the accumulation of metal at the casting point of the sleeves. If this metal accumulation builds up on the spaceband sleeve, the thin matrix side walls will be crushed in or broken off, producing hair lines between the letters on the slugs.



G

E. This matrix shows the reference character facing the front. The operator, if he so desires, can look at the matrices in the assembling elevator to identify each letter in the line, should it be necessary.

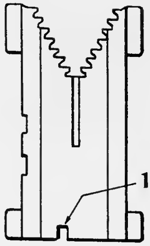
F. Identification marks will be found on the left side of the matrix body. The point size is stamped at the left. Each type face or font is given a number, and this number is stamped on the right side of the matrix body. Tiny notches *1* in the bottom of the matrix body are used with a gauge which has numerals; the notches corresponding to the numerals when used in the gauge, identify the matrix face.



H

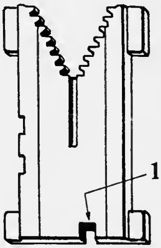
G. Intertype matrices have wide combination teeth which cover half or more of the width of the matrix tooth recess. In the thinner matrices the teeth are as wide as the matrix body. The original style teeth were 1/32″ thick and

the wider matrices hung at an angle on the bars during transfer. *This wide-tooth patented feature is exclusive with the Intertype;* it makes matrices having wide teeth hang straight during transfer and distribute better. Matrix teeth are shaped like an isosceles triangle, and provide support for the matrices while being transferred to the second elevator and distributor box, and while traveling along the distributor conveyor screws. Each letter has its own combination of teeth, the rest being blanked out. When the matrix reaches its proper magazine channel it drops from the distributor bar and out of engagement with the distributor screws, because the distributor bar rails are open at that point to correspond with the matrix combination. The hole, shown at *1,* lightens the weight of heavy matrices.



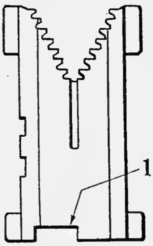
I

H. The distributor box bar point slot *1* is cut in the left side of the matrix body to a depth within 1/32″ of the right side. This slot makes all matrices of all sizes a common thickness in the bottom of the slot to pass the distributor box bar point so that only one matrix at a time can be lifted into the distributor screws.



J

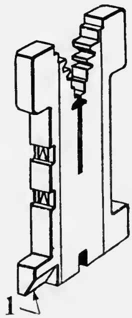
I. Equipments A, B, C and D Intertypes are furnished with matrices having font distinguisher slots cut in the bottom of each body, *1.* The slot is placed in different positions according to the point size of the matrix. The slot is 1/16″ deep and .040″ wide. Some sizes of matrices have the same slot—for instance, 6, 12 and 24 point. Wrong fonts can be readily determined by the size of the matrix or the letter character. This notch working with the font distinguisher prevents "wrong fonts," which are simply matrices from another font being present in the magazine in use.



K

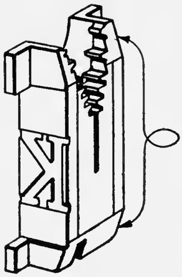
J. Slots in matrices used in the Intertype Mixer are cut deeper and about twice the width of the standard font notch explained above in paragraph I. The Mixer notches *1,* are cut in the opposite side from the standard font notches.

K. Matrices intended to run in the side magazine have a wide font notch, that is, the space taken up by all font notches from the center line of the matrix body is cut out, so that matrices from the side magazine may be used at any time regardless of which main magazine is in use.



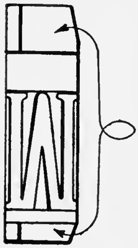
L

L. The lower back lugs of most matrices are beveled at the lower left-hand corner *1*. As the matrix enters the assembling elevator the beveled corner cannot damage the side wall of the casting cell of the matrix immediately preceding it.



M

M. Some thick-bodied matrices in the larger sizes are beveled both top and bottom, left side of the body. The lower bevel insures clearance of the matrix in relation to the channel entrance partition when dropping from the distributor. It also helps smooth action in the assembler. In case two thick matrices (such as capital M) travel along the distributor bar, the top bevel provides clearance in the dropping of the first matrix so the second one which continues to advance as the first one is dropping, will not advance against it and cause a distributor stop. The top bevel is made possible by Intertype wide combination teeth.



N

N. Certain thick matrices are provided with shoulders, which extend out from the matrix body and alongside the lugs about .020″. These shoulders furnish a bearing for the matrices in the first-elevator jaw and permit them to hang straight while they are being transferred.

O

O. A logotype consists of two or more matrices riveted together to form a word, symbol or abbreviation of a word. Logotypes usually run pi. If, however, the matrix is subject to infrequent use or the body is too thick to permit free passage of the logotype through the first style pi tube, the tooth recess is blanked out and the logotype drops into the quad box at the transfer channel.

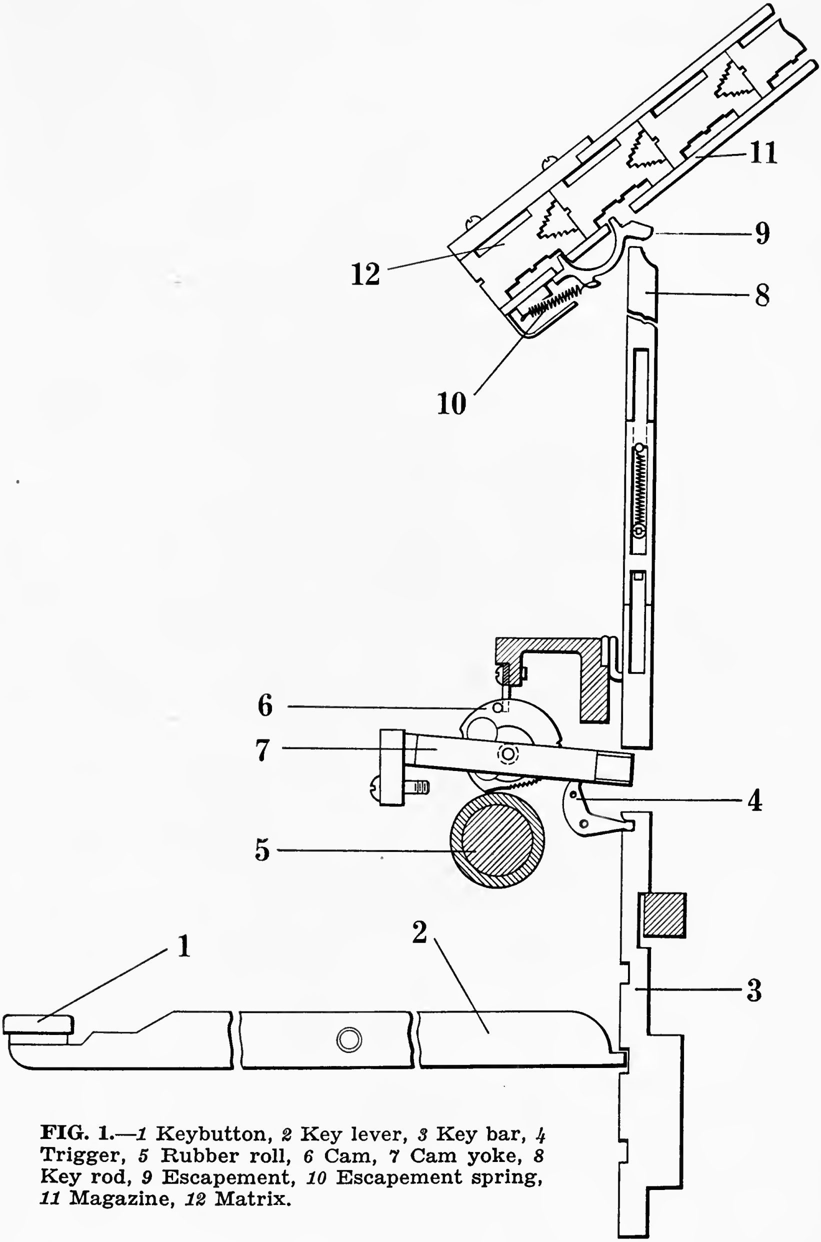


FIG. 1.—*1* Keybutton, *2* Key lever, *3* Key bar, *4* Trigger, *5* Rubber roll, *6* Cam, *7* Cam yoke, *8* Key rod, *9* Escapement, *10* Escapement spring, *11* Magazine, *12* Matrix.

Chapter III

KEYBOARD AND ESCAPEMENT MECHANISM

In order to thoroughly understand the operations and functions of the parts employed in the release of a matrix from the magazine, it is necessary that the following list of motions of the parts involved be studied.

The keybutton *1* Fig. 1, is depressed and the key lever *2* pivoted centrally upon a rod, raises the key bar *3;* a small trigger *4* fitting into a notch in the upper end of the keybar and having a curved motion, moves from under the end of the cam yoke 7. The cam yoke drops its cam *6* upon a revolving rubber roll *5*. The cam has teeth part way around its periphery to make its action positive the instant it drops upon the revolving rubber roll. As the cam revolves, the yoke raises key rod *8* which in turn pushes up on escapement *9*. As the escapement is rocked its front point is lowered, releasing the first matrix in the channel of the magazine *11,* the matrix *12* falling out by gravity.

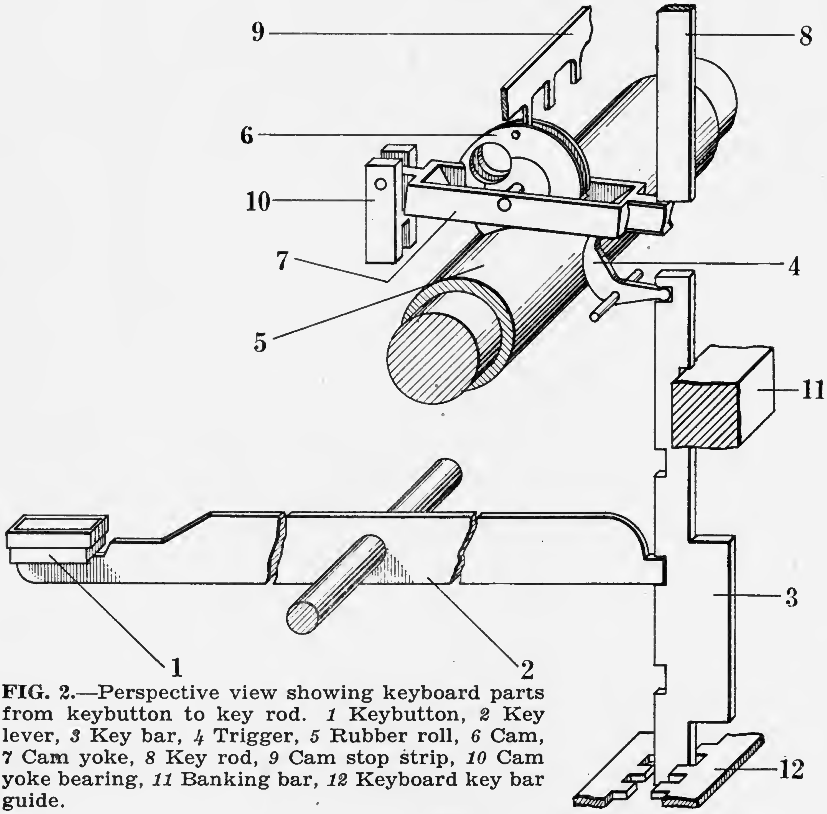


FIG. 2.—Perspective view showing keyboard parts from keybutton to key rod. *1* Keybutton, *2* Key lever, *3* Key bar, *4* Trigger, *5* Rubber roll, *6* Cam, *7* Cam yoke, *8* Key rod, *9* Cam stop strip, *10* Cam yoke bearing, *11* Banking bar, *12* Keyboard key bar guide.

Meanwhile the matrix immediately following slides forward, its upper ear banking against the rear point of the escapement. The key rod drops by gravity after having been raised by the cam, and the spring *10* pulls the escapement *9* back to normal position. As the escapement returns to normal position its rear point is lowered and the matrix again slides forward, the lower lug or toe passing over the front point of the escapement before the point can rise. Simultaneously, the upper matrix ear has advanced and the rear point of the escapement has returned to normal position so that it engages the upper ear of the matrix, arresting further passage of the matrix until the key is struck again.

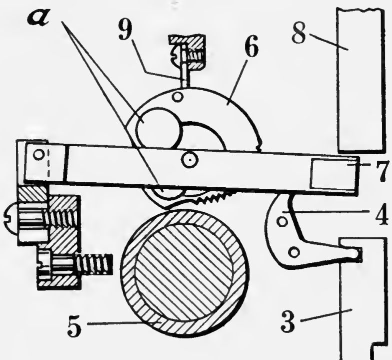


FIG. 3

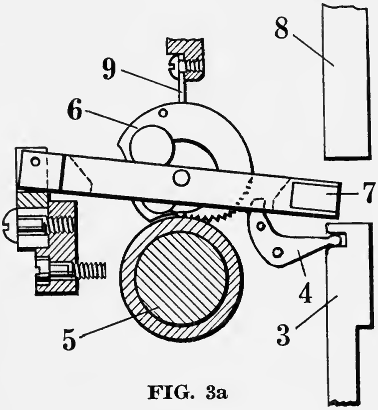


FIG. 3a

FIG. 3.—This drawing represents a keyboard cam resting at normal position. A small cross pin in cam *6* engages a tooth in stop strip *9* against which the cam rests while in normal position. The number *3* represents the key bar, *4* is the trigger, *5* the rubber roll, *6* the keyboard cam, *7* the cam yoke, and *8* the key rod. At *a* are shown two holes cut out of the cam wheel. This is for the purpose of making the cam wheel heavy on one side so that when it drops upon the rubber roll it will revolve without hesitancy through the "bite" of teeth in the periphery of the cam.

FIG. 3a.—The cam and yoke *6* and *7*, have fallen upon the revolving rubber roll *5;* the trigger *4* has been tilted by key bar *3* letting the cam fall upon the rubber roll.

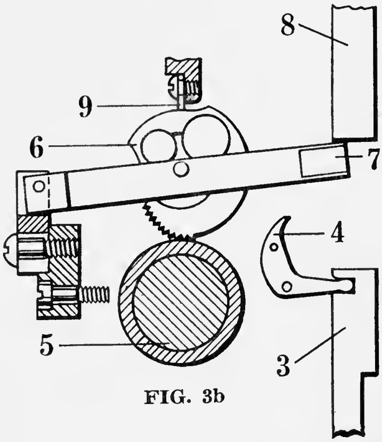


FIG. 3b

FIG. 3b.—The rubber roll *5* has revolved cam *6* which now has reached its highest radius. The yoke *7* is pushing key rod *8* against the escapement. After this the cam will return to normal position and the yoke will rest on trigger *4*. A cross pin in the rim of the cam will engage stop strip *9* and stop the revolution.

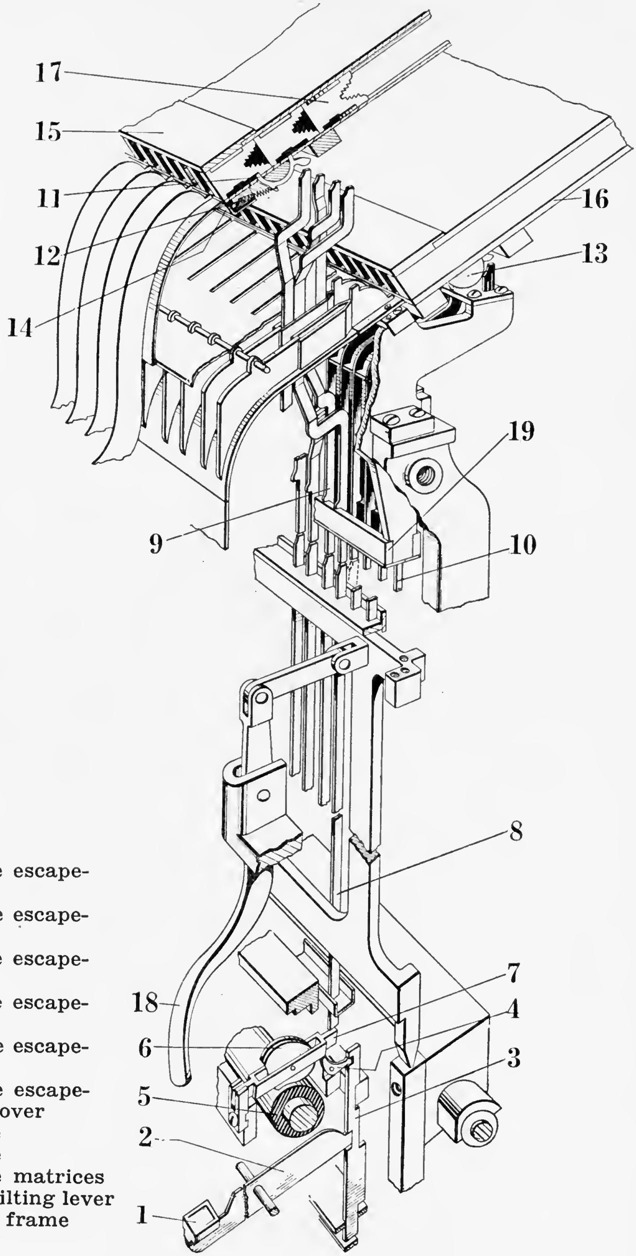


FIG. 4.

1 Keybutton
2 Key lever
3 Key bar
4 Trigger
5 Rubber roll
6 Cam
7 Cam yoke
8 Key rod
9 Upper magazine escapement rod
10 Lower magazine escapement rod
11 Upper magazine escapement
12 Upper magazine escapement spring
13 Lower magazine escapement bar
14 Upper magazine escapement spring cover
15 Upper magazine
16 Lower magazine
17 Upper magazine matrices
18 Key rod frame tilting lever
19 Escapement rod frame guide

The Importance of Gravity.—Having become familiar with the motions of the parts employed in the release of a matrix, the novice should understand that—

The key lever itself is pivoted centrally (balanced) upon a fulcrum rod.

The weighted key bar, suspended at the rear end of the key lever, returns the key lever to its original position after a keybutton has been struck.

When a key is depressed a matrix is released, not directly by the touch of the key lever which has just been pressed, but by setting a cam in motion, which in turn actuates a key rod and escapement. This accounts for the extremely light touch of the keybuttons.

The trigger supports the free-moving end of the cam yoke as long as the key bar is not raised to tilt the trigger from under the yoke.

The cam yoke is supported in normal position at its pivot end by a square post called a bearing, and at the other end by a small curved piece called a trigger (mentioned above). When the trigger is set in motion the free end of the yoke drops until the cam comes in contact with one of two revolving rubber rolls.

The key rod, due to the rising motion of the cam yoke, pushes against the escapement and falls by gravity to its normal position after the yoke has receded.

The escapement is rocked by the key rod for release of the matrix, and the return stroke of the escapement is effected by a spring after the key rod has fallen away.

Gravity affects the motions of the key lever, the key bar, the cam and yoke, the key rod, and the dropping of the matrices after being released. Gravity is mentioned here to emphasize the necessity of caring for these parts so that they will function properly.

Mixer Keyboard and Escapement Mechanism

The Release of a Matrix.—Depressing the keybutton *1* Fig. 4, raises the rear end of the key lever *2,* which in turn lifts the key bar *3.* The key bar tilts trigger *4* so that it is retracted from under cam yoke *7,* which drops and causes cam *6* to revolve on rubber roll *5.* The yoke *7,* due to eccentric action of cam *6,* raises key rod *8,* and in turn pushes escapement rod *9* against upper magazine escapement *11.* The front point of escapement *11* is lowered as the rear point rises. This releases the first matrix from the magazine. The second matrix slides forward a short distance until its upper ear engages the rear escapement point. The key rod and escapement rod drop away from the escapement by gravity after the cam has revolved. The escapement spring *12* pulls the escapement back to normal position with the front point holding the second matrix, which will be the first to drop when the key is depressed again.

Escapement action for the lower magazine is exactly the same as for the upper magazine. The operator shifts a rack by means of lever *18* so as to

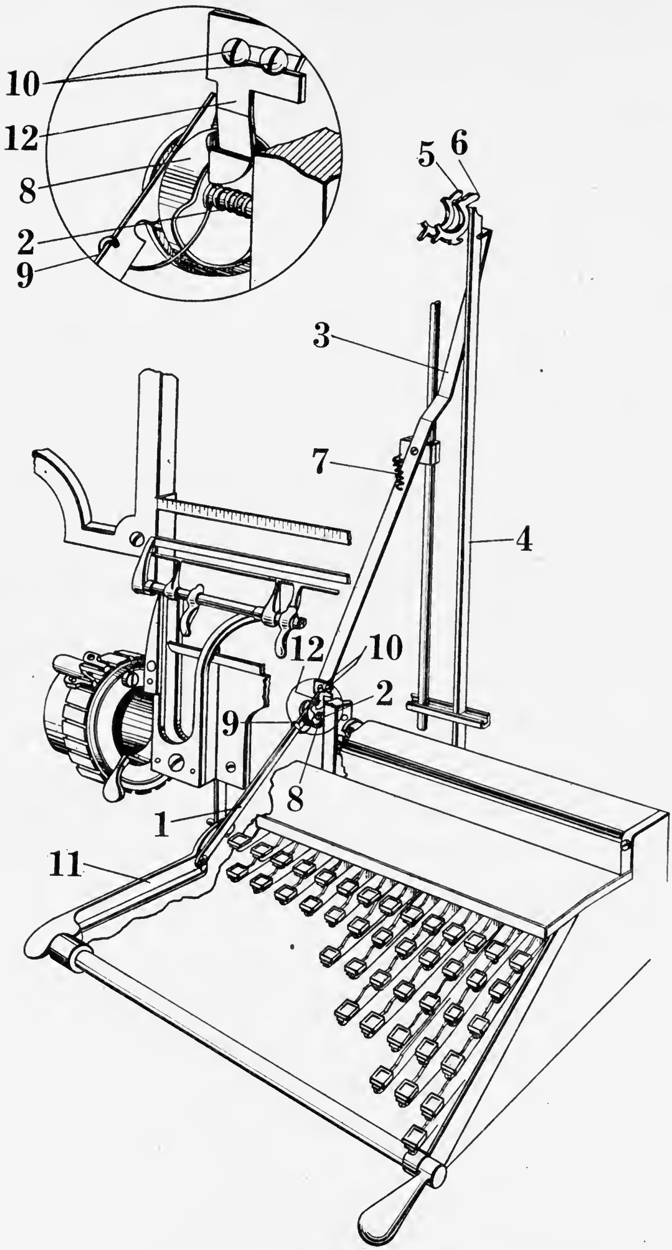


FIG. 5.—Twin channel attachment.

cause the key rods *8* contained within the rack to register with the lower magazine escapement rods *10*.

Twin Channel Attachment

On display Intertypes and 42-em machines a twin channel attachment can be furnished. Main and split magazines have two lower case "e" channels (the first two at the left side of the magazine). As the assembling elevator is raised to send in lines to be cast, the assembling elevator lever operates a mechanism that permits matrices to be drawn alternately from the two channels.

All the lower case "e" matrices used in one line will be drawn from one channel; the line of matrices is sent in and the next line set will have all lower case "e" matrices drawn from the other channel, and so on.

On the 42-em machine, long lines require a great many lower case "e" matrices, since this is the most used letter of the English alphabet.

Detailed Action of the parts is as follows: When the assembling elevator is raised to send a line of matrices to the delivery slide, lever *1*, Fig. 5, having a hook at the end where it engages cam *8*, turns the cam one-sixth of a revolution. The cam operates the key rod lever *3*. The key rod lever *3* has a forked upper end engaging the lower case "e" key rod *4*. The key rod alternates between magazine escapements *5* and *6* at each upward movement of the assembling elevator.

Spring *7* hooked to the clamp and key rod lever, holds the lever against cam *8*. It also holds the key rod in alignment with the escapement.

Screws *10* are loosened in case it is necessary to align the upper end of the key rod *4* with the escapements *5* and *6*. The key rod lever operating lever *12*, is slotted to accomplish this adjustment.

Spring *2* working against cam *8* is merely a tension spring for the purpose of holding cam *8* stationary through friction until the cam operating lever *1* again moves the cam.

Spring *9* holds cam operating lever *1* down to prevent its slipping out of engagement with the cam.

The upper end of key rod *4* occupies either space normally taken up by two key rods. The partition is blanked from between the two spaces to permit the rod to alternate between the two lower case "e" channel escapements.

Occasionally clock oil should be used to lubricate the bearings. When once set in proper adjustment, no other attention is required.

One advantage of this attachment is that it can be thrown out of use when a font containing one channel of lower case "e" matrices is in use.

Single Spaceband Cam

The keyboards on Intertypes A, B, C, D and X are each equipped with a single spaceband cam that is somewhat larger in radius than the regular

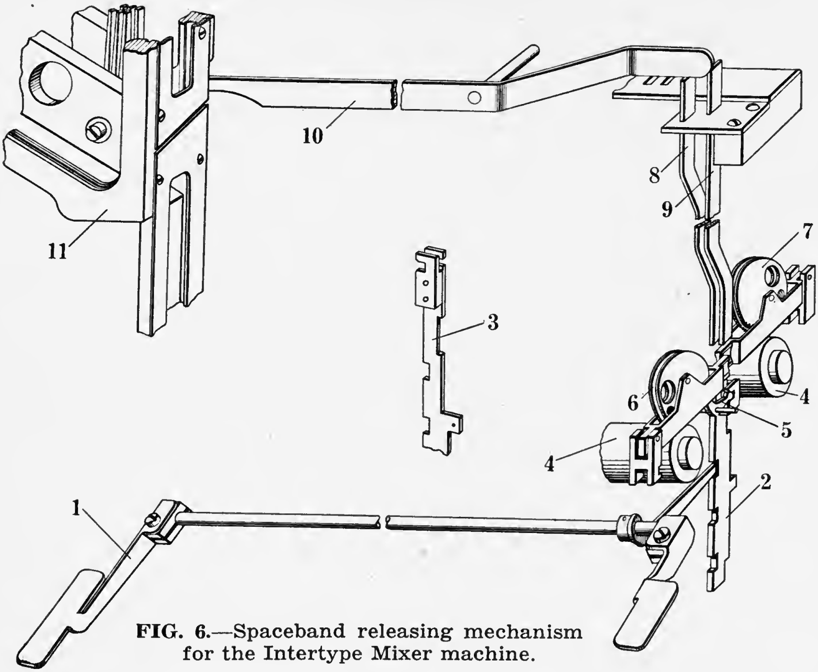


FIG. 6.—Spaceband releasing mechanism for the Intertype Mixer machine.

keyboard cam. Equipment E carries two spaceband cams—one for each magazine.

Providing a spaceband cam of different size than the regular cams is necessary in order to time the dropping of the spacebands with the delivery of matrices from the magazine. Spacebands are much heavier than the average matrix and drop from the box just above the assembler. The distance traveled from the box to the star wheel is much shorter than the distance from the magazine to the star wheel. Therefore, it is necessary to use a means of retarding delivery of the spaceband so that it will not cut in ahead of the last letter in a word. There is, of course, a tendency on the part of the operator to strike the spaceband key a trifle too soon after the last letter in a word and due allowance therefore is made in the design of the machine.

Mixer Spaceband Cams

On Equipment E the two magazines are positioned at a greater distance from the star wheel than on the other equipments, and the lower magazine is positioned a slightly greater distance than the upper magazine.

As mentioned above, the Intertype Mixer is provided with two spaceband cams. The lower magazine spaceband cam has the greatest radius and spaceband delivery is retarded more than for the upper magazine.

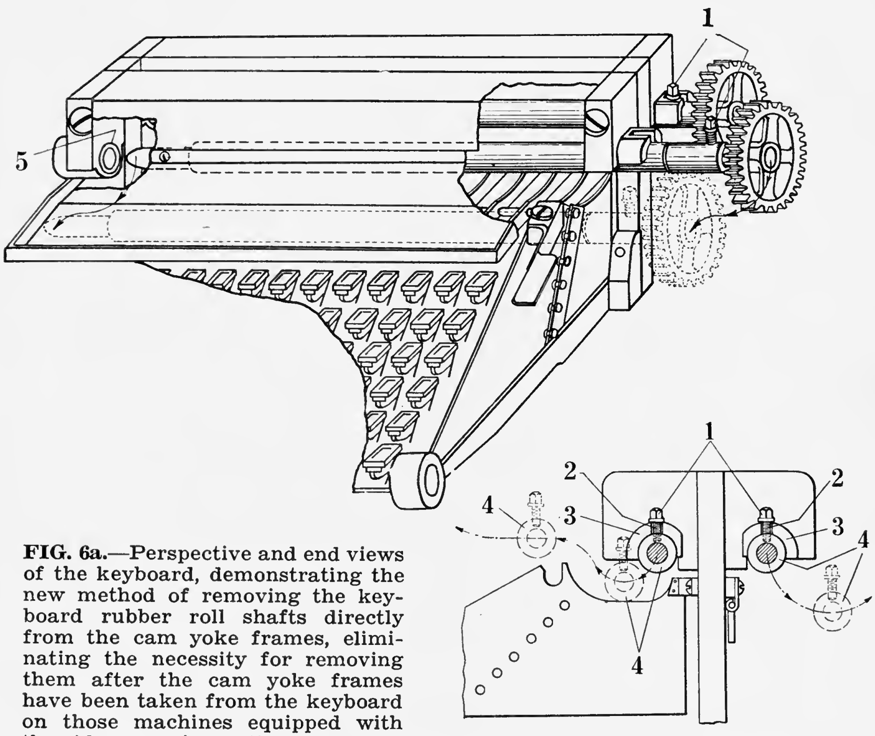


FIG. 6a.—Perspective and end views of the keyboard, demonstrating the new method of removing the keyboard rubber roll shafts directly from the cam yoke frames, eliminating the necessity for removing them after the cam yoke frames have been taken from the keyboard on those machines equipped with the side magazine unit.

The lower portion of the cam yoke frame adjacent to the shaft bearing *3* at the right side of the keyboard has been cut away to permit the rubber roll shafts to be lowered out of engagement with the right-hand bearings. A threaded stud *2* is set in each outside shaft bushing *4*, and each stud registers with a slot cut in the right-hand keyboard frame bearing *3* at the top. A square nut *1*, when tightened, supports the bushing and holds it rigidly in place to determine the normal position of the rubber roll shaft. The left end of each rubber roll shaft is rounded for easy entrance into the bearing *5* when the shaft is being replaced.

To remove the front rubber roll shaft, first take the copy tray from the top of the keyboard, which is held in place by the two screws in the cam yoke bearing bar, lift out the spaceband key and hinge rod; loosen the stud nut *1*, slide the shaft to the right until the stud *2* clears out of the slot in the right-hand bearing *3*. The rubber roll may then be lowered and lifted out as indicated by the curved arrow line at the left of the end view. The rear rubber roll shaft is removed in the same manner as the front one, after removing the key bar and cam yoke dust covers.

The key bar is used to operate both cams, and has a two-notch top. When the spaceband key lever is struck, the key bar sets both cams in motion, which in turn raise both spaceband key lever key rods. According to the magazine in use, one rod will register with the spaceband box lever.

These parts require the same attention that the regular keyboard cams receive.

The motions taking place to release a spaceband on the Mixer machine are as follows: The key *1* Fig. 6, is depressed, raising the key bar *2*, which in turn, having a double top (that is, two notches) operates trigger *5* for both the upper and lower magazine spaceband cams *6* and *7*. The cams revolve on rolls *4* and *4* and raise the rods *8* and *9*. If the upper magazine is being used, the front key rod *8* will register with the box lever *10* and release a spaceband from the box *11*. The small detail *3* shows construction of the spaceband key bar.

Rubber Rolls and Ferrule

It is highly important that the rubber rolls and shafts be given the necessary attention to keep them revolving steadily and that the rubbers be clean and fairly resilient. Remove the rolls from the machine occasionally and clean them with coarse sand paper, finishing the cleaning process by either washing them with soapy water or high test gasoline, using at least a four-inch fibre brush.

Correct Diameter of Rubber Rolls.—Another important thing to watch is to see that the rubber rolls are not crowded onto the shafts in such a way that their diameter is more than one inch at any point throughout their length. If larger than this the keyboard cams may not clear the stop strip teeth. Also if one roll is larger than the other, transposition of matrices will occur when the keyboard is operated.

If the rubber roll shafts are revolving at a speed much in excess of 275 or 280 revolutions per minute, trouble may be encountered by the operator in getting double letters, that is, two lower case "o" matrices or two lower case "e" matrices together in a word. The reason for this is that the cam operates the escapement so rapidly that matrices will not have sufficient time to slide over the escapement points by gravity and the second matrix will be caught at its lower lug by the front point of the escapement.

The ferrule at either end of the roll is held in place by a spring clip or ring. This prevents the roll from creeping beyond the end of the shaft and rubbing the cam yoke frame, which would slow the speed of the rolls. The ferrule also aids in preventing excess oil creeping to the roll in case too much has been applied to the shaft bearing.

Earlier Intertypes had cast iron rubber roll shaft bearings. Present Intertypes are equipped with bronze bearings, channeled with graphite. A light oiling at regular intervals with medium grade machine oil is beneficial.

Keyboard rubber rolls are furnished in two styles—plain and corrugated. Both have their merits. The plain rubber roll, of course, furnishes a more

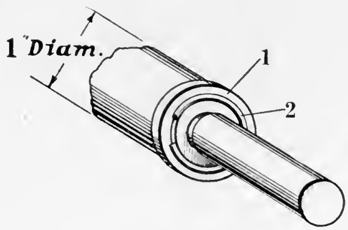


FIG. 7.—Keyboard Rubber Roll Retainer. This simple device consists of a ferrule *1*, held in place by a spring clip *2*, which effectively prevents the rubber roll creeping upon the shaft. The rubber roll, as indicated in the drawing, should always be one inch in diameter throughout its length.

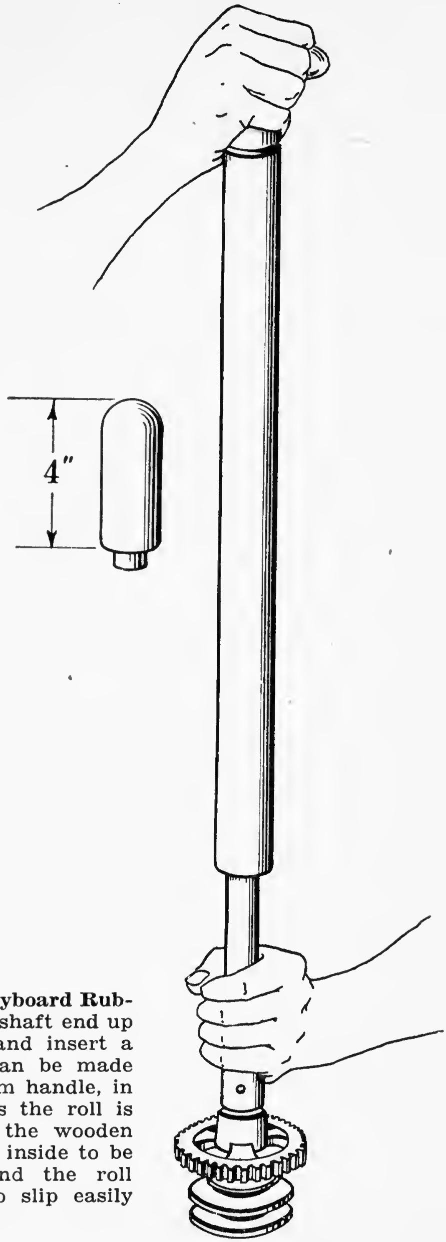


FIG. 8.—To Apply a Keyboard Rubber Roll, stand the roll shaft end up on a table or bench and insert a wooden plug, which can be made from a section of broom handle, in the top of the roll. As the roll is pushed on the shaft, the wooden plug will cause the air inside to be compressed and expand the roll which will cause it to slip easily upon the shaft.

accurate surface upon which the cam revolves. In some plants, during cool weather, no fire is kept over night and the keyboard chills. Until the keyboard is warmed the next morning the cams act sluggish, that is, they fall upon the rolls but do not revolve immediately. To overcome this condition, corrugated rolls are furnished which have about 60 teeth or corrugations upon their surface.

Non-Response of Matrix

When a matrix fails to respond to the touch of a keybutton, it may be due to any one of several causes. The best manner in which to locate the trouble is to first note whether the key rod is rising and falling. If not, in all probability the keyboard cam does not revolve, for one of the following reasons:

Gummy substance holding up the free end of the cam yoke. Remove the cam and wipe the end of the yoke on a cloth; also wrap the cloth around a thin piece of wood, insert it in the guide plate slot and wipe clean.

Rubber roll hard or glazed. Remove both rolls and use coarse flint paper, then wash in gasoline.

Teeth of the cam dull or rounded. This is likely to occur on a machine that has been in use a long time. Use a small three-cornered needle file and touch up the teeth.

Rubber roll diameter too large. The roll should not exceed one inch in diameter. When applying a roll do not crowd it so as to cause variations in diameter throughout its length.

Cam pivot extremely dry. Use *clock oil* only for lubrication—just a small drop applied with a toothpick or flattened wire dropper.

A loose cam yoke bearing screw.

If none of the above causes are present, and the key rod moves up and down at the touch of the keybutton, see if *the key rod spring has become disconnected, or is weak in tension.* A key rod can be removed to strengthen the spring by turning out the two rear screws in the upper key rod guide, pushing back the guide strip and lifting out the key rod wanted.

Groove cut in rubber roll by the cam wheel. A roll can be patched by using a piece of old roll, cutting away the defective part and applying a patch. It is not advisable to make a rubber roll patch less than six inches in length. A smaller piece might be twisted out of position by the action of the cams.

Accumulation of dirt and grit in escapement bearing. Remove escapement and rub it on fine abrasive cloth, afterwards polishing in graphite.

Escapement spring has lost tension or has become disconnected. If the tension is weak, clip off two or three coils and replace.

Matrix having had a lug slightly twisted in the distributor box.

Escapement burred and binding in its seat.

An assembler entrance partition out of alignment with the magazine channel so that a matrix protrudes part way out of the magazine. Bend the partition into place.

Oil or gummy dirt in the magazine channel or on the matrices. Wipe off

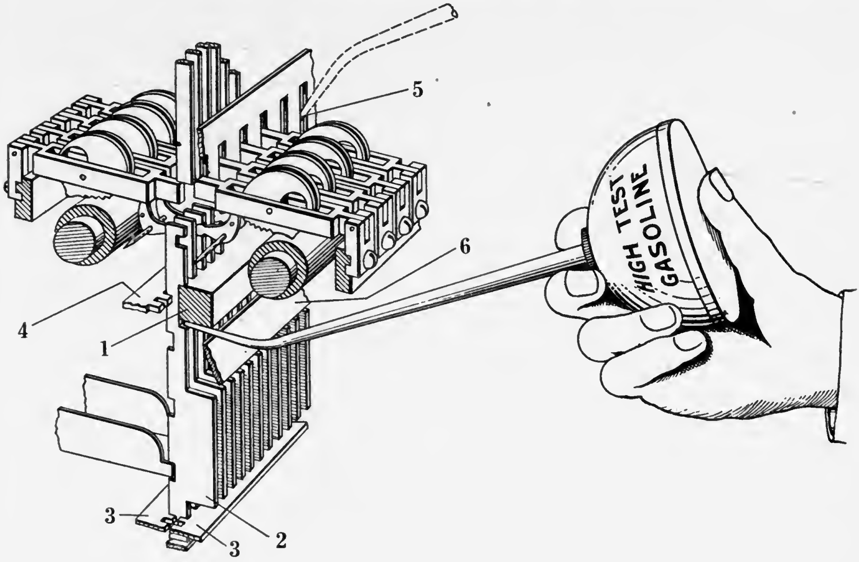


FIG. 9.—Two methods of applying high test gasoline to a sticking keyboard key bar, which causes "doubles" or continuous matrix response. The application of gasoline will wash out rust, small particles of dirt, metal, paper or fine accumulations from between the key bars, guides and the banking bar. These fine accumulations cause the key bar to remain suspended in an upward position instead of dropping down to normal after the operator's finger pressure has been released from the keybutton. At *5* the high test gasoline is being applied to the top of the key bar through the cam yoke slot in the guide plate after removal of the cam yoke.

the matrix lugs. If very much oil has fouled the channels it may be necessary to run out the matrices and clean the magazine. Oil in the proper place has its function, but it becomes a source of extreme annoyance when used in excessive quantities. Oil in combination with dust and dirt which settle in machinery comprises a nasty compound and must be removed from the magazine. It should be noted here that too much oil applied to the distributor bearings, the assembler bearings, the assembling elevator, the front and back mold wipers will cause trouble; especially is this true of the distributor screws.

Burred matrix toes from impact with some part of the machine where the matrix travels, will cause matrices to stick in the magazine.

A matrix having had one or more lower lugs or toes damaged by the mold, due to the sending in of a tight line.

If the stroke of the delivery slide is too rapid and a matrix is jarred above the rest of the line when it passes into the delivery channel, it is possible to damage the lower lugs. Avoid raising the assembling elevator too forcibly.

Doubles or Continuous Response

If a keybutton stays down after having been depressed, the matrices will continue to drop. Sometimes two letters will respond when only one is wanted. This is caused by an accumulation of rust, dirt, oil or bits of type metal that have worked into the space between the key bar *2*, Fig. 9, and the guides *3* and *4*, or between the key bar *2* and the banking bar *1*. The remedy is to use a long spout oil can kept for the purpose and filled with gasoline. Squirt a little of the fluid on the key bar *2* just under the banking bar *1*. Apply the end of the spout between the banking bar *1* and the blade *6* for the keyboard locking apparatus, in the region where the key sticks. Vigorously tap the keybutton. Occasionally a key lever will stick down, due to the presence of a chip of metal or paper lodged between the lever and its slot in the keyboard top plate.

After having tried to remedy a double letter as explained above, and the keybutton still persists in sticking down, remove the cam and yoke of the offending character, insert the end of the oil can spout in the cam yoke slot in the frame plate and squirt gasoline on top of the key bar, shown at *5*. In this way gasoline will flow down the length of the key bar *2* and loosen any foreign matter lodged between the key bar and the guides or banking bar.

If continued and persistent trouble is experienced with double letters, the keyboard should be removed from the machine and thoroughly cleaned.

Transpositions

A transposition is nothing more nor less than a matrix or spaceband misplaced by reason of retarded delivery; that is, it has dropped out of time with the other matrices and spacebands in the assembled line.

Transpositions are exasperating to the rapid operator who "feels" the flow of matrices coming into the assembler, at times as many as twelve matrices per second.

The possibility of human error in fingering a keyboard is always present. Operators should strive to finger the keys evenly, especially on combinations of letters that occur in simple words or long word endings. Repetition of certain word forms may lead to carelessness.

It has long been the contention of men in a position to know that transpositions of letters in type matter are more often due to mechanical causes than from error in the human element. None of these causes, however, originally existed in the machine itself. They are the result of conditions brought about through constant use or abuse. Insofar as possible, each part of the machine is built to compensate for wear and if properly maintained, free from dirt and dust accumulations, there should be but little trouble experienced with transpositions from mechanical causes.

Following are given the contributing causes of transpositions, many of which would never occur if proper attention were given in caring for the machine.

The first thing to consider is the keyboard. If, after long use, the cam does not start turning as promptly as it should due to rounded teeth, the fall of the matrix will be out of time. Sharpen the cam teeth with a small three-square file.

Rubber rolls may be glazed or hardened. Roughen with coarse flint paper and wash in gasoline or soapy water. The rubber roll should not be more than one inch in diameter. If one roll is larger than the other, because of its improper application on the shaft, there will occur a slight variation in the timing of the matrix delivery.

A cut in the rubber roll directly under the cam.

On machines that have been used a long time, the tension of the rubber roll shaft pulley friction spring may be weak. Replacement of the part will be necessary. The points of the friction spring may be bent to increase the tension until a new one can be ordered in case none are in the supplies list.

Sluggish action of the escapement. Polish on fine abrasive cloth and rub in graphite.

Keeper rod binding against a magazine escapement because of a kink in the rod.

Dry cam yoke pivot. Use *clock oil* only and apply just a little to the pivot with a toothpick or similar tool.

Oil on matrices or in the magazine. Light matrices (thin ones) will drop slowly from this cause. Excess oil on distributor screws, assembler bearings and front and back mold wipers are contributing causes.

An interfering assembler entrance guide at the mouth of the magazine. Use duckbill pliers and bend the partition to place. If several guides interfere with the prompt dropping of the matrices it is possible that the assembler front will need relocating. In case a single guide is interfering with the delivery of the matrices from one channel, bend the guide to permit free passage of the matrices from the magazine. Turn the keyboard roll shaft slowly by hand after depressing the keybutton for the offending character and note how it drops from the magazine. The keyboard belt should be removed from the pulley while doing this.

Uncertain speed of the matrix delivery belt. See that the pulley bearings are free and oiled. If there is too much slack in the belt, adjust the idler pulley by means of the nut back of the pulley stud.

The assembler star wheel may not have enough tension to throw matrices to an upright position in the assembler. The star wheel shaft is provided with a brass plate or disk inside of the small gear that is driven by the intermediate gear and a nut and spring. The purpose of this device is to throw matrices positively yet gently into the assembling elevator. If the spring is too strong, matrices will jump out of the assembler, or else the assembler slide will advance too far when the matrix takes its position in the line. The brass disk and spring should have some oil. The tension of the spring can be weakened by squeezing it in a vise. Likewise the tension can be increased by tapping

the spring with a light hammer while rolling it on the corner of an iron block or the jaw of a bench vise. Learn to judge the spring tension by thrusting a finger against the star wheel while in motion. It should have just enough tension to throw quad matrices smoothly into the assembler while they are being assembled with spacebands. This is not an infallible test and every one learning to adjust the star wheel spring tension will require several trials before he can judge whether or not it is right.

A worn star wheel can be the cause of transpositions. It will be noticed that the front and back corners of the spokes are first to wear out. When the spoke corners have been reduced 1/32″ or more apply a new star wheel. Star wheels are cheap as compared to the cost of machine corrections.

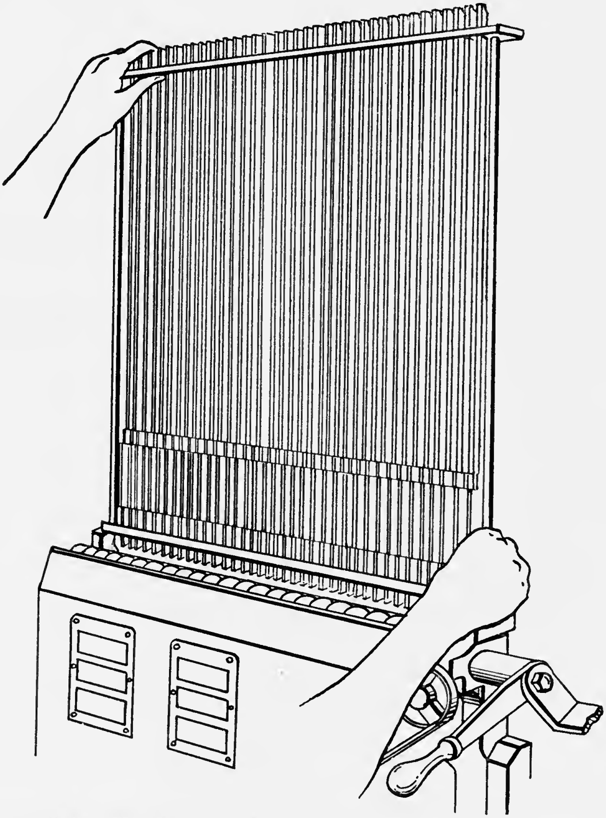


FIG. 10.—Showing Easy Method of Removing the Key Rods by lifting out the keyboard key rod frame on machines A, B, C, D and X, after having disconnected the spaceband key lever key rod and taking out the two front screws in the upper key rod guide.

To Remove Any Single Key Rod, take out the two rear screws in the upper key rod guide, push back the guide and lift out the key rod.

A machine operating at a speed less than six and one-half lines per minute may cause transpositions.

If the upper key rod guide is not positioned correctly uncertain matrix delivery will result. The key rods may be slipping to one side of the escapements instead of fully registering with them. Adjust the upper key rod guide sidewise, then tighten the screws. The relation of the key rods to the escapements can be noted by looking at them from the rear of the machine while the lower magazine is in operating position.

The assembler entrance cover cushion may have slots worn in it from long use. In this case renew the spring cushion.

The upper edge of the small assembler chute cover may extend farther in than the lower edge of the large cover, so as to trip matrices as they pass. This can be readily fitted for correct position.

The assembler chute finger should be set so that thin matrices will not bound out of the assembler. This finger is adjustable and can be positioned in case of the first style assembler, so that the thickest matrix in the font will just pass underneath. In the case of the new style assembler the prongs of the finger can be set down as far as possible toward the chute rails and to the left as far as clearance with the assembling elevator will permit. The chute finger is intended to direct matrices to the star wheel, and as the wheel

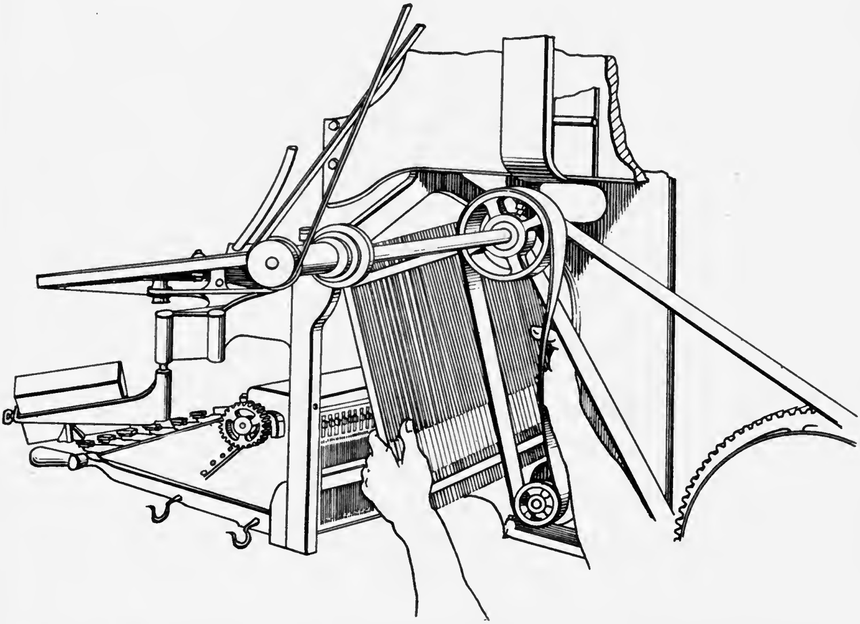


FIG. 11.—Method of removing the key rod tilting frame on the Mixer machine, should it be necessary to replace a key rod overmotion spring.

flips the matrix to an upright position the spring acts on the top of the matrix to aid it in assuming this position. Some attention should be given to assembler entrance guide No. 1 next to the chute spring so that it will just permit the thickest matrix in the font to pass through without hesitancy. The position of the lower end of this guide has a great deal to do with matrices bounding out of the assembler.

Key Rods and Frames

Between the keyboard and the magazine are mounted the key rods. There are 90 key rods in the standard machine for the letter characters, and a small key rod at the right of the main key rods, to which is connected the spaceband lever and box.

The first Intertypes were not furnished with a frame to support the key rods, there being a thin guide strip set between the two keyboard cam yoke frames, and a guide mounted upon the intermediate bracket at the upper ends of the key rods. Present Intertypes are equipped with keyboard rod frames so as to facilitate removal of all the key rods at one time by taking out the two front screws in the top guide and lifting out the assembled frame (Fig. 10). The removal of any particular key rod may also be effected by taking out the two rear screws in the top of the frame which hold the guide strip in place. This frame is the same for Equipments A, B, C and X. Equipment D resembles it in every detail except that there are 72 key rods instead of 90 as in the other equipments.

This key rod frame is applicable to all outstanding machines equipped with the first style guides.

Removing Mixer Key Rod Rack.—Equipment E key rods are mounted in a swinging rack. The rack may be removed by disconnecting the magazine shift lever link, disconnecting and removing the spaceband key rods, and removing the rear cam yoke frame. The rack may then be pulled out at its lower end and dropped down at the back of the keyboard (Fig. 11) so that repairs can be made. The same overmotion spring is used in the E key rod as in the other machines. As soon as the rack has been replaced, the rear cam yoke frame can be put back in place after passing a locking wire through the end of the frame and the trigger holes to hold the triggers rigid so they will properly engage the key bar notches, into which they fit. After the frame has been put in position, withdraw the trigger locking wire.

FIG. 12

FIG. 12.—View of section of keyboard key rod, showing the overmotion spring, which functions when the key rod has reached its highest stroke in releasing a matrix by operating the magazine escapement. At this point the upper and lower parts of the key rod compress slightly causing the key rod to finish its upward thrust against the escapement with a yielding pressure.

Keyboard Key Rod Overmotion Spring.—In order to obtain what is called an overthrow motion or cushion stroke when the key rod has reached its highest point, a spring is mounted in each key rod. The rod is made in two parts with suitable slide and lugs and held together by this spring. In case a matrix lug stalls above the front point of the escapement, the overmotion spring comes into play and the parts, including the rubber roll and cam do not become damaged.

The keyboard key rod spring must not be confused with the magazine escapement spring. Each has its purpose and when interchanged the results will not be satisfactory. The key rod spring tension is much heavier than that of the escapement spring and must overcome the resistance offered by the escapement spring at the time the key rod operates the escapement. If used on an escapement the excess stress may result in non-response of the matrices and cause the cam to cut a groove in the rubber roll.

Should an escapement spring be used in the key rod as an overmotion spring, it will not have enough tension to overcome the weight of the key rod, the stress of the spring working with the escapement and the friction between the moving parts.

Once in a while a key rod spring will lose its tension or become disconnected from the hooks. In this case it is easily replaced by taking out the two back screws at the top of the key rod guide, pushing the guide strip away and lifting out the key rod wanted.

The Intertype unit key rod frame is a great convenience to the person taking care of the machine. It encourages the periodical cleaning out of bits of metal, paper, copy clips and other small particles which lodge in and around the lower key rod guide and between the key rods.

On machines A, B, C, D, and X, when replacing the frame, position it sideways so that the key rods will match the magazine escapements. There is a little play in the upper key rod guide screw holes for this purpose. Looking from the rear the relation of the key rods to the magazine escapements can be observed, while the lower magazine is in operating position.

There is no sidewise adjustment of the key rod frame for the Mixer machine. If a key rod does not register with an escapement rod, bend the top of the rod with a pair of pliers to bring it in line.

Chapter IV

KEYBOARD MAINTENANCE

Keyboard Removal.—From two to four times a year, depending upon the cleanliness and atmospheric conditions in the plant, remove the keyboard cam yoke frames and rollers and thoroughly wash, clean and lubricate the parts.

The first Intertypes made will require a little different treatment in removing the keyboard than those now made. The difference is in the method of support for the key rods. In the first type, it is necessary to remove the key rods singly for the reason that the lower guide is not rigid enough to support the rods after both front and rear cam yoke frames are removed.

Removing the keyboard is not a difficult task and the following information constitutes the correct method of proceeding:

Tilt back the magazine cradle.

If the machine is of the first style, turn out the two screws for the upper key rod guide strip (the rear piece). Lift out the key rods from the machine and lay them in their regular order on a galley or flat tray of some kind. This is important for the reason that no trouble will be encountered due to improper working of the key rods if, after cleaning the keyboard, they are returned to place exactly as removed from the machine.

If the machine is equipped with the new style key rod frame, turn out the two top screws (front) and lift the assembled frame from its bearing and set it aside.

Remove the cam yoke frame covers, the keyboard driving belt, the copy tray and take out the end screws in the cam yoke frames. Lift off both the front and rear assembled frames.

Next in order will be to disconnect the lever link from the assembling elevator, detach the assembling elevator counterbalance spring, drive out the taper pin in the assembling elevator handle and pull out the shaft. Take out the small hexagon head screw at the right side of the keyboard post where it fastens the frame to the intermediate bracket and loosen the two screws in the keyboard base. Sit down and place the knees directly underneath the keyboard. Take out the loosened keyboard base screws, lift off the keyboard and take it to the work bench or table.

Dismantling the Keyboard.—Position the keyboard on the bench with the rear end toward you and at a higher level than the front end. Remove the banking bar and the keyboard locking bar. Lift out the spaceband key lever. Be careful not to stretch the tension of the spaceband key bar spring. Take out the key bars and place them upon a galley in the order of their removal. Next turn the keyboard around and remove the fulcrum rods upon which the

key levers are pivoted by taking out the two screws that hold the keeper strip at the right side of the keyboard. Then take out the key levers, one row at a time.

Washing the Parts.—Put one gallon of gasoline in a large pan. Use high test gasoline as low test gasoline in some instances is greasy and it will be difficult to dry the parts thoroughly. Using a stiff fibre brush of good size (at least four inches long), wash all the parts, including the key rod frame. A tooth brush is not an efficient article for this work.

After all the parts have been washed and dried, using compressed air if available for this purpose, look over the key levers and if any rough spots remain at either end or at the pivot hole, use metal polish to remove any corrosion that might cause the parts to work poorly. Vigorously polish the key bars on a pine board having graphite spread upon its surface. Shake surplus graphite from the key bars. Use a small stick of wood and cloth and wipe out all slots in the frame.

Assembling the Keyboard.—The key levers can now be sorted into their six different lengths and reassembled, starting with the lower row. Smooth the fulcrum rods with fine emery cloth and polish with graphite. After the key levers are in place and the keeper strip for the fulcrum rods has been applied, turn the board around and again tilt up the rear end and set the key bars in place in the order in which they were removed. Apply the banking bar and the keyboard locking bar and lever. Replace the spaceband key lever after the keyboard has been put back on the machine.

As mentioned above, the cam yoke frames should be cleaned more often than the keyboard.

Washing the Keyboard Cams.—Lay the cams in high test gasoline in the order in which they are taken from the frame. Use a good-sized fibre brush and brush each cam separately. Wash the rubber rolls in gasoline, and do not forget to wash the frames, especially adjacent to the bearings. The entire frame needs as much attention as the cams themselves do. It is not good practice to take out the keyboard cam yoke bearing screws and try to clean and lubricate the cams in one operation.

If compressed air is not available, dry each cam with a soft cloth. If possible let them lay out to dry over night so as to permit the gasoline to evaporate from around the pivots where it cannot be dried with a cloth. Any gasoline remaining at the pivot will dilute the clock oil. Apply clock oil to each cam pivot between the cam wheel and the yoke. Use a toothpick or instrument of similar size and apply the oil sparingly.

Lubricating the Cams.—Use nothing but a high grade of *clock oil.* The keyboard cam pivots are properly oiled before shipment with the best oil obtainable. Light oils used for guns and sewing machines are not suitable for keyboard cam lubrication because most of them dry out too rapidly. Common machine oil gums and in cool weather it congeals, causing the cams to work in a very sluggish manner. Clock oil is the best for the purpose and

there is no substitute. Usually your jeweler will supply the required oil, or the Intertype Corporation will furnish it on order.

Removing Keyboard Cam Yoke Frames.—Remove the cam yoke frame covers. Remove the keyboard driving belt. Remove the copy tray from the top of the keyboard. Take out one screw in each end of the frames (four in all) and lift them from the machine.

In case of an early style Intertype it will be necessary to take out the front frame, then block up the lower key rod guide in the center with slugs, a piece of stereotype base or a block of wood. Then the rear cam yoke frame can be removed as outlined.

Replacing Keyboard Cam Yoke Frames.—When returning the cam yoke frames to place, first run the 1/16″ trigger locking wire through the extra hole (upper one) in the triggers. This is necessary so that the ball points of the triggers will be held rigidly, and will enter notches in the key bars without trouble. When the frames have been screwed to place, pull out each locking wire. The lower wire, which is just like the locking wire which keeps the triggers rigid when replacing the frames, is necessary as a pivot for the triggers and if pulled out the cams will not operate.

First Style Side Magazine Unit Keyboard

The first style single magazine side unit carries a 34-channel split magazine. There are thirty-four keybuttons. This style keyboard is not power-driven, but matrices are released by direct touch of the keybutton. There are no overmotion springs in the key rods, these rods being made in one piece. The rods are notched at the lower ends and straddle the key levers.

Occasionally clean the parts and lubricate the key lever pivots, and the ends of the levers where they engage the key rods. Use clock oil for the purpose. It is well to do this at the time the main keyboard is being cleaned.

Power-Driven Side Magazine Unit Keyboard

Side magazine units now furnished are power-driven, that is, they operate exactly like the main keyboard. The maintenance required is exactly the same as for the main keyboard and it should be cleaned or overhauled at the time the larger keyboard is receiving such attention.

Chapter V

MAGAZINES AND ESCAPEMENTS

The Intertype escapement consists of two parts—the escapement proper, which is semi-circular in shape, and a small steel coil spring, the function of which is to return the escapement to place after it has been operated by the key rod. The escapement is made of non-corrosive metal, and is designed to have a large bearing surface. The curved inside of the escapement works on a brass bar bearing attached to the magazine. The Intertype escapement mechanism is built as a part of the magazine and each magazine has its individual set of escapements. The same style escapement is used exclusively on all magazines, including the side magazines.

There are seven different sizes of escapements varying from .037″ thick to the ones used in the side magazines, the thickest of which are .087″. They are made of various thicknesses on account of the different widths of the letters running in the magazine channels.

Removal of Escapement.—Occasionally, it may be necessary to remove an escapement that needs polishing or replacement. The following procedure can be used: Remove the magazine from the machine and place the top side up on the work bench or table. Remove the two escapement cover screws at either end of the magazine so the escapement spring cover on the under side of the magazine may be removed. Turn the magazine over and depress all the escapements at one time with the handle of a magazine cleaning brush to relieve the escapement spring tension from the locking rod, and withdraw the escapement locking rod. Any escapement can now be removed. Polish both sides of the escapement by rubbing lightly on fine abrasive cloth laid on a flat surface, then rub the sides with graphite. The escapement is ready to return to place. Polish the escapement locking rod with the abrasive cloth and rub on some graphite. Put the escapement in place and start the locking rod in the groove in the escapement bar. Depress all the escapements with the magazine brush handle and push the locking rod to place.

Application of a New Escapement.—When applying a new escapement, some fitting may have to be done. Select the proper thickness of escapement for the particular magazine channel. Remove any burred edges and polish the sides. Put it in place and rock it by hand, noting whether the front point clears the bottom of the magazine channel. Also the rear point must not rise so high as to interfere with the matrix body passing over it.

It is repeated here that if the speed of the keyboard rubber roll shafts is much in excess of 275 or 280 revolutions per minute, the operator will experience difficulty in getting two letters in succession, that is, two lower case "e" matrices or two lower case "o" matrices. The reason, as has been explained,

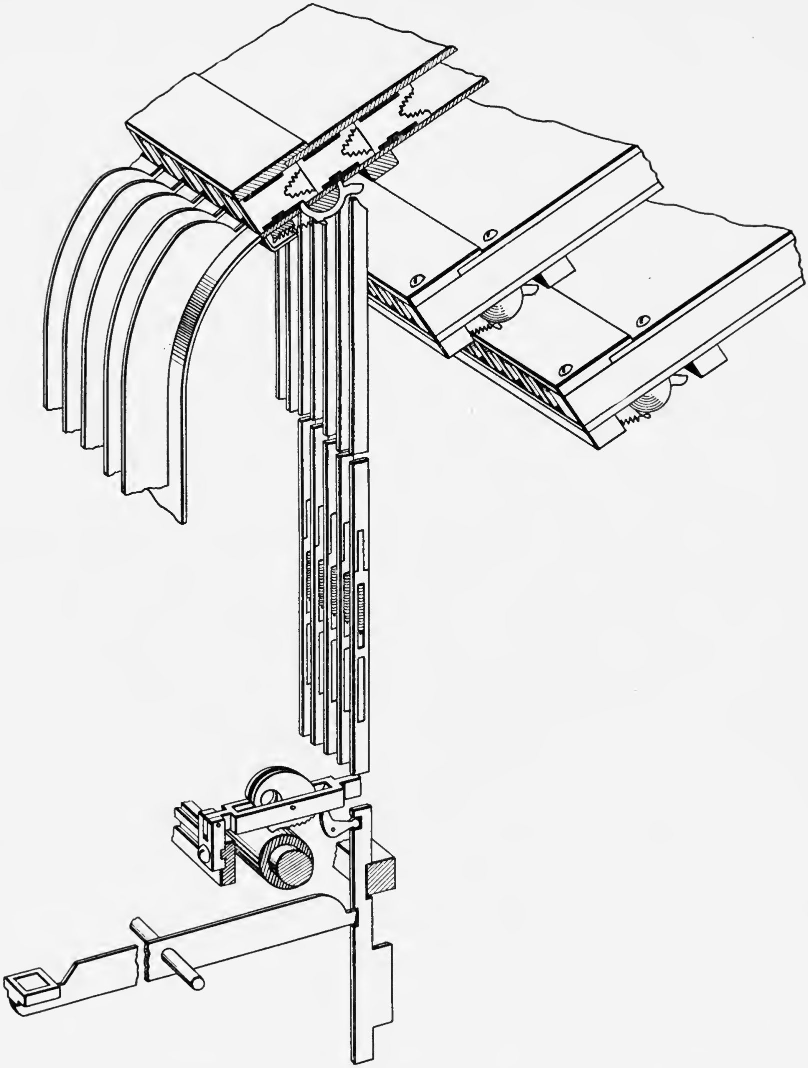


FIG. 13.—Perspective view of the working parts of keyboard and magazine matrix releasing mechanism used on the C Intertype. The first magazine, which is in operating position, has been cut away to show matrices resting in normal position. The first matrix is held by its upper back ear against the front point of the escapement. All the matrices above the first one are supported in the magazine channel by the first matrix.

lies in the fact that the escapement points alternate so rapidly that the second matrix cannot slide fast enough by gravity over the front escapement point. If the machine is speeded up with a large motor pinion without reducing

the speed of the keyboard rubber roll shafts, trouble may result in that two letters of the same kind may not be delivered in succession. Burned-out coils in the motor armature may also produce this trouble because of increased motor speed.

The proper speed of the machine is from six and one-half to seven lines per minute.

In Fig. 14, the shoulder on lug *1* limits the upstroke of the escapement against the magazine. The front lug regulates the normal position of the escapement through the action of the spring *3* which causes the lug to bank against the bottom of the magazine.

Should the escapement keeper rod *4* be bent or kinked it will prevent free action of the escapements. In this event, lay the keeper rod on an iron surface and while rolling it with one hand, tap it gently with a light hammer. Then rub some dry graphite on the rod and put it back in place.

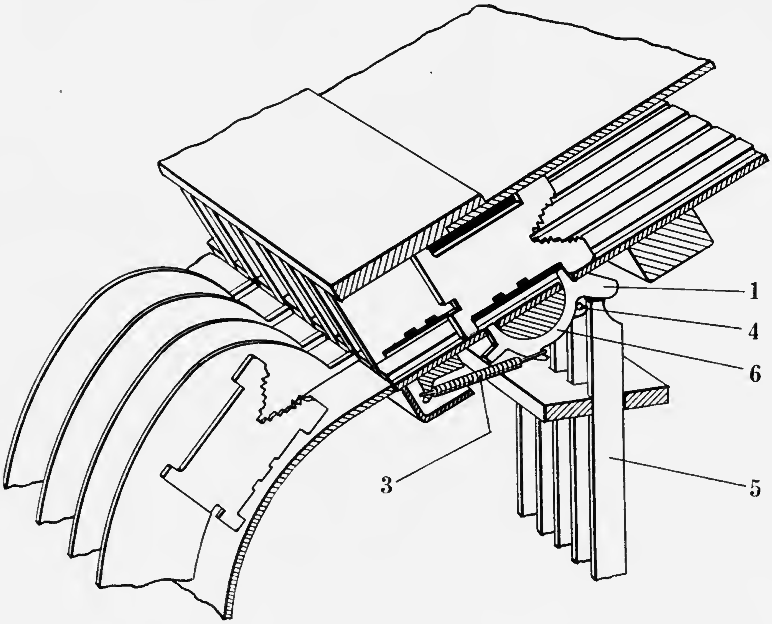


FIG. 14.—As has been previously explained, in order to release a matrix from the magazine, key rod *5* which has been caused to make an upward stroke, due to the action of the keyboard cam, presses against lug *1* of the escapement, rocking the escapement *6*, causing the front escapement point to make a downward stroke, releasing the first matrix, which slides out of the magazine by gravity. As the front escapement point descends the rear point rises. During this action the second matrix slides forward until its upper back ear banks against the rear escapement point and is held in that position until the first matrix has left the magazine. As the keyboard cam permits the key rod *5* to recede, the escapement *6* is returned to normal position again by spring *3*, and the matrix will slide forward to a position like that shown in Fig. 13.

If some of the heavier matrices, such as the em quad, em leader, capitals M or W, drop into the assembler without being released by depressing a keyboard keybutton, the cause may be found by observing the action when the heavy matrix is being distributed. If upon striking the top matrix in the channel, the first one at the lower end of the magazine bounces out into the assembler entrance, it may be that the escapement spring tension is too weak. The same effect may be obtained when the magazine cradle is tilted forward and returned to operating position from the back of the machine. The spring tension can be increased by cutting off two or three coils. This, condition, however, is not likely to occur except in rare cases after the magazine has been in use for a long time.

Assuming the spring tension to be all right and the first matrix jumps over the front escapement point, examine the escapement to make sure it is not sticking or that the front point is not worn down.

The Magazine

The containers for matrices are called magazines and there are about eighteen different kinds. They all have the same general appearance from the outside, but are modified to suit the purpose for which they are intended and the country in which they are to be used. Among the different types are the main or standard, the split, side, foreign and some specials. The general shape of the main magazine is trapezoidal. All side magazines are rectangular in shape.

The main magazine consists of a number of parts, the most important of which are the top and bottom channel plates. Grooves are cut in these brass plates to carry the matrices. Each groove is cut for a certain size matrix, and corresponding grooves in each of the plates must match exactly; they must be parallel and alike in dimensions throughout. To insure obtaining the required accuracy, a special automatic machine is used to cut these grooves.

The top of the main magazine is flared to provide good distribution. None of the grooves come to one center point. They vary from three to ten degrees. The size of the grooves conforms to the size of the matrices, that is, the lower case "i" does not take up as much space as the letter "w," and its groove or channel is therefore not as wide. There are a few thousandths clearance at the bottom of the plates so that the matrices will drop out easily. On account of the grooving in the plates, they would buckle if they were not reinforced, and for this reason each magazine has a series of cross bars to hold the channel plates straight. The position of the top cross bar is most important as it holds the magazine in exact alignment.

There are partitions inside the magazine .065″ wide, to hold the channel plates apart and to keep them in line.

In tilting the cradle back when changing magazines, matrices would slide out of the upper end of the magazine if it were not for the automatic cover or shutter which is always closed over any magazine not being used. There are two cams at the top of the distributor bracket and two suitable

levers automatically operate these cams and open the shutter when the magazine desired for use comes to operating position.

On the bottom of the lower plate of each magazine there are two rows of perforations, through which the escapement points project. The escapement bar has ninety-one semi-circular grooves on each side into which the escapements fit.

In order to keep the escapements in place springs are attached to the escapement spring bar, which has hooks on the rear edge. The escapement spring bar is covered by a guard so that the springs will not be damaged.

The escapement cover has no grooves but provides clearance for matrices to fall freely from the magazine. When matrices slide forward they are guided by the grooved bottom plate. Momentum of the matrices keeps them moving.

A main magazine filled with eight point matrices weighs about 73 pounds. An empty magazine weighs 55 pounds.

Sizes of Escapements for Main Magazines A, B, C, D, E and X

Character	Chan. No.	Size	Character	Chan. No.	Size	Character	Chan. No.	Size
e	0	.047	ffl	31	.087	E	61	.087
e	1	.047	Em Space	32	.087	T	62	.077
t	2	.047	Comma	33	.037	A	63	.087
a	3	.057	Period	34	.037	O	64	.077
o	4	.047	Colon	35	.047	I	65	.057
i	5	.037	Semi-colon	36	.047	N	66	.087
n	6	.057	?	37	.057	S	67	.067
s	7	.047	En Space	38	.047	H	68	.087
h	8	.057	(	39	.037	R	69	.087
r	9	.047	|	40	.037	D	70	.087
d	10	.057	Quote	41	.037	L	71	.077
l	11	.037	!	42	.047	U	72	.087
u	12	.067	Hyphen	43	.037	C	73	.067
c	13	.057	Thin Space	44	.037	M	74	.087
m	14	.087	)	45	.037	F	75	.077
f	15	.047	En Leader	46	.047	W	76	.087
w	16	.087	Apostrophe	47	.037	Y	77	.087
y	17	.057	*	48	.047	P	78	.077
p	18	.057	1	49	.047	V	79	.087
v	19	.057	2	50	.047	B	80	.077
b	20	.057	3	51	.047	G	81	.077
g	21	.057	4	52	.047	K	82	.087
k	22	.067	5	53	.047	Q	83	.077
q	23	.057	6	54	.047	J	84	.057
j	24	.037	7	55	.047	X	85	.087
x	25	.067	8	56	.047	Z	86	.067
z	26	.047	9	57	.047	@	87	.087
fi	27	.057	0	58	.047	℔	88	.087
fl	28	.057	$	59	.047	&	89	.057
ff	29	.067	Em Leader	60	.087	Em Dash	90	.087
ffi	30	.087						

Split Magazines

Another type of magazine is called a split, the combined sections of which (upper and lower) equal a regular magazine. The magazine accommodates

sets of display matrices usually from twelve points and up to the larger sizes. The upper half of a split magazine is similar to the upper part of a regular main magazine. The small strip-like lid attached to the upper half can be lifted before changing the magazine so as to observe whether there are any matrices projecting above the top of the split. Split magazines, if used on Equipments A, B, C or E are 90-channel, and if used on Equipment D, will be 72-channel. There is a special split magazine with narrow channels for Lining Gothic and other small-face matrix fonts.

Side Magazines

The matrix channels of side magazines run straight and parallel the length of the magazine, instead of at an angle as in the main magazines, and carry about eight matrices per channel, or 200 per set. The escapements used in the side magazines are exactly like those for the main magazine.

All side magazines are split. Those now made can be used for composition of large display faces up to and including sixty point face, having a maximum letter width of one-half inch, with maximum matrix lugs .090″ thick. Faces for display in smaller sizes can also be used in side magazines, or they may be equipped to carry special characters for various kinds of intricate composition requiring a large number of mathematical signs and figures.

Side Unit No. 1 has one 34-channel narrow magazine. This unit is a single magazine equipment. The magazine is removable for changing from one to another by simply lifting from the machine. The escapements retain the matrices at the lower end. The top of the magazine, however, must not be inverted when lifted from the machine as it is not fitted with a shutter to keep the matrices from sliding out through the top.

Side Unit No. 1a has one 30-channel magazine. This unit is a single magazine equipment. The magazine is removable for changing from one to another by simply lifting from the machine, the same as Side Unit No. 1.

Side Unit No. 2 equipment consists of three magazines of 30 channels each, mounted in triangular form upon a frame. A lever placed in a convenient position enables the operator to lift up the counterbalanced frame holding the three magazines, and revolve the frame so that the desired magazine is turned to the bottom horizontal position. The lever may then be lowered and the magazine will be in operating position.

Side Unit No. 3 having 34-channel magazines, can be added to any Standardized Intertype at the factory or in any composing room. For Intertypes A, B, C and D side unit No. 3 is furnished with one or three magazines; for Intertype E (Mixer) two or four magazines.

This side unit applied to the Mixer machine with the tripod, gives four magazines on the side. Including the two main magazines, this makes a total of six magazines on the machine ready for use.

The full side equipment for Intertypes A, B, C and D consists of three 34-channel magazines mounted in triangular form upon a tripod frame. A lever

placed in a convenient position enables the operator to lift up the counter-balanced frame holding the three magazines; the frame is then revolved so that the desired magazine is turned to bottom horizontal position. When the lever is lowered the magazine will be in operating position.

On Equipment E Intertypes, a fourth magazine is mounted in a frame directly under the tripod and receives its matrices from the lower distributor. The matrix width and capacity ranges from the thinnest matrices made up to and including the maximum width matrix (one-half inch).

Handling Magazines

Always place a main magazine in the rack or storage place lower end up. Do not bump or jar magazines unnecessarily. It is possible to spring them, which will interfere with the free dropping of matrices. In case of split and side magazines always handle them with the lower end down. These types of magazines are not equipped with shutters as are the main magazines.

Changing Magazines

Equipment A.— Throw back channel entrance. Pull magazine frame back and downward. Remove magazine. Place another on the frame, and rock it forward to operating position. Close channel entrance.

Equipment B.—Throw channel entrance to open position. Turn magazine frame operating lever back so top magazine will be in operating position. Tilt the frame backward from the rear of the machine and lift off the magazine to be changed. After substituting magazines, tilt the frame forward again, turn frame operating lever, except in case the upper magazine is to be used, then close channel entrance.

Equipment C.—Throw channel entrance back. Turn magazine frame operating lever or "cradle crank" as it is sometimes called, until upper magazine is in operating position. Raise magazine frame cradle latch and lower cradle backwardly from the rear of the machine. Lift off magazine and replace with another. Lift cradle up and turn frame operating lever until magazine to be used is in operating position. Close the channel entrance.

Equipment D.—The same in all respects as changing magazines on Equipment C, except that in case there is a split magazine in the cradle top the split is changed by merely lifting it from the machine, when the cradle is in any of its three positions.

Equipment E.—Throw channel entrance auxiliary stop. Pull channel entrance open, until it rests upon the stop. Lower magazine frame until safety hook catches in distributor bracket. Remove magazine. After replacing magazine, lift out safety hook and raise frame to operating position. Close channel entrance and throw auxiliary stop to the left. It will be noticed that as the magazine frame is lowered when changing magazines the shutters for both upper and lower magazines close almost instantly. One cam works the shutter lever and a link connects levers for both magazines.

Model X (Two-magazine).—To remove the top magazine, open the channel entrance and close the upper magazine shutter by pulling out on both shutter finger stops or catches. This will permit the shutter fingers to rise, whereupon the shutter will close. The magazine may then be lifted out of the frame from the front of the machine. It will be noted that the sides of the cradle are cut out to provide for a good hold on the magazine when changes are made. To remove the lower magazine, first remove the upper magazine as directed above, then shift the lower magazine to operating position by the magazine frame operating lever; close the lower magazine shutter by tripping the two shutter finger latches which hold the lower shutter down through the medium of the left and right-hand shutter fingers, after which the lower magazine may be lifted out of the frame from the front of the machine. When a split magazine is used on the upper deck, the split magazine support lies across the frame supporting the upper end of the lower split (split magazine), and must be lifted out before changing the lower magazine.

Side Unit Nos. 1 and 1a.—Simply lift the magazine from the machine and replace with another. However, hold the magazine in an upright position as it is not provided with a shutter to close the top.

Side Unit No. 2.—Simply push magazine from the bottom to disengage locking lugs and lift from triangular frame. The magazine to be removed must not be in bottom position when removed.

Side Unit No. 3.—Turn the tripod until the magazine to be changed is in upper right position. Push magazine from the bottom to disengage locking lugs and lift from the frame. The magazine to be removed must not be in bottom position when removed. The lower magazine for the back distributor on the Mixer machine can be removed by first starting it out by pulling a convenient lever called the lower magazine elevator bar, which will start the magazine, from which point it can be pulled out sideways from the frame. Hold these magazines with the top end up as they are not equipped with shutters. After placing another magazine upon the tripod frame pull downward so the lugs will lock tightly on the frame.

Cleaning Magazines and Matrices

Magazines and matrices should be cleaned at regular intervals. No definite frequency can be given in this book, because of the varying conditions under which machines are operated, their location in printing plants and the climatic conditions according to location in various parts of the world.

Caution.—Remember that the cleaning of matrices and magazines will not be necessary to any extent if you do not carelessly apply oil in excessive amounts to distributor bearings or other parts so that it will overflow to the paths traveled by the matrices through the machine.

If it becomes necessary to clean matrices, run them out of the magazine and place them edgewise on a pine tray, having grooves which hold them at

an angle. Such a tray is furnished by the Intertype Corporation, but if not available, use regular type galleys.

The lugs of matrices that have not been fouled with oil can be polished with a typewriter eraser or electrotyper's polishing square. Be careful not to push the rubber used for cleaning into the mold cells of the matrices. A discoloration near the mold cells of the matrices will do no harm. If the matrices are fouled with oil it will be necessary to wipe them with a cloth to remove the oil.

It is best to place the magazine on a convenient bench or table. Remove the escapement cover and turn the magazine over. Block up the shutter with small wooden blocks, shown at *1,* Fig. 15. The magazine should be brushed out with the magazine cleaning brush. After brushing the dust and dirt loose, saturate the brush with cleaning fluid and squirt some into that section of the magazine that is receiving attention, then pass on to the next section.

Give particular attention to the top channel plate. If the magazine has not been cleaned for some time, small patches of gummy substance will ac-

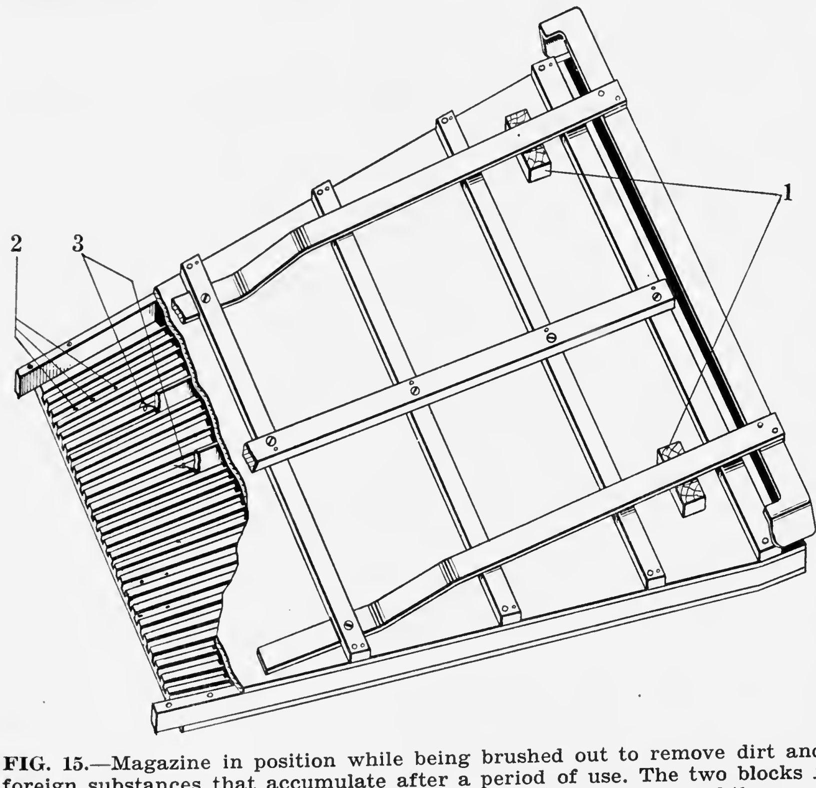


FIG. 15.—Magazine in position while being brushed out to remove dirt and foreign substances that accumulate after a period of use. The two blocks *1* under the shutter springs hold the shutter clear of the upper end of the magazine so that the cleaning brush may be freely passed through the magazine.

cumulate in the channels, *2*, spaced 1¼" apart (the length of a matrix), and if these are not removed they will interfere with the rapid sliding of matrices, especially by a fast operator on double letters.

High test gasoline may be used for cleaning purposes. Benzol and carbon tetrachloride are also good agents because they evaporate quickly. If high test gasoline is used, brush the magazine until it is thoroughly dry.

Matrix response will not be improved if the greasy residue from the gasoline has not been removed from the channels. Next hold a light at one end of the magazine and look through to see if any hairs from the brush, shown at *3*, have caught between the partitions and the channel plates, or in the region of the escapements. These can be broken off with the matrix hook. Do not take the magazine apart to remove the hairs.

After reassembling the escapement cover and escapement spring guard, and the blocks *1* used to hold up the shutter have been removed, return the magazine to its frame on the machine.

Cleaning the Distributor Screws.—While running under power, clean the distributor screws with strips of cloth saturated with high test gasoline. If the channel entrance is opened, hang a weight on the distributor clutch lever. Also cover the channel and magazine entrances with paper or cloth while cleaning the screws.

The magazine is now ready to receive the matrices that have been cleaned. Grasp about two or three inches of matrices, pull out the shifter and slide them onto the second-elevator bar, with the distributor running and repeat the process until the entire set has been returned to the magazine.

The pi stacker and pi matrices should always be cleaned at the time of cleaning the magazine and matrices.

Procure a thin stick of wood and wrap a clean cloth around the end. Saturate the swab with the cleaning fluid employed in cleaning the magazine and thoroughly wipe the assembler entrance plate, guides and the inside of the cover.

Bear in mind that it will not be necessary to dismantle a magazine at any time. It might be unpreventable in case the machine has passed through a fire or flood or if some special machine work is required. Under normal conditions nothing can be gained by taking apart a piece of machinery that would be difficult to reassemble properly without equipment designed especially for the purpose.

Chapter VI

SPACEBANDS AND SPACEBAND BOX

Spacebands are used on the Intertype as a means of providing spaces between matrix groups so that the words in the printed line may be evenly separated and easily distinguished; secondly, they furnish a means of justifying each matrix line before the slug is cast so that each line will be exactly the length desired; thirdly, they lock the matrices tightly between two jaws so that molten metal cannot enter between the matrices.

Spacebands are deposited in a separate magazine or box at the left of the main magazine and just above the assembling elevator. Being of a radically different shape than matrices, another means of returning them to the box must be used. The distance from the spaceband box to the star wheel is much shorter than the distance from the magazine to the star wheel and an entirely separate mechanism is employed to release the spacebands than that which releases the matrices.

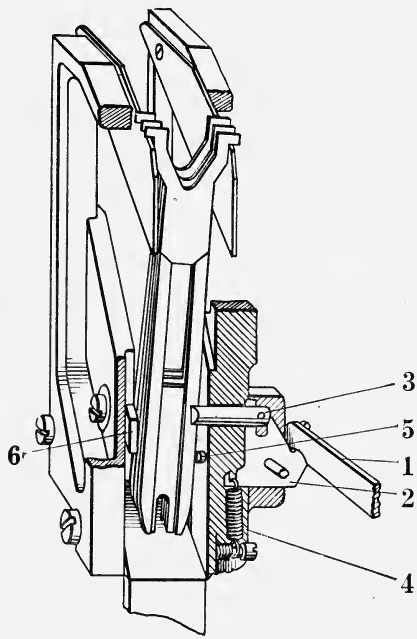


FIG. 16.—Opened view of the spaceband box, showing how the spacebands stand at normal position, against releasing plunger *3*. The spacebands rest upon the slanting floor of the box and the sleeve ears are supported by two inclined rails at the top of the box.

FIG. 16

The length of the spaceband is about four inches. It consists principally of two parts, the long wedge or "band" and a sleeve with lugs or ears. The sleeve is dovetailed and slides in a slot in the band or long wedge. Spacebands must always be put in the machine with the sleeve or short section to the right. The reason for this is that the rear or casting edge of the sleeve is about .001″ thicker than the front edge, so as to provide a tight lockup of the spacebands and matrices during the cast. The sleeves are also slightly hollowed in the middle as an additional safeguard for tight casting lockup. If spacebands are turned with the short sleeve to the left of the band or long

wedge part, hair lines may appear in the print and the matrix side walls will be ruined.

A regular (thick) spaceband with the sleeve at the top of the long wedge, measures .038″ normally. When the sleeve is at the bottom of the long wedge the spaceband will measure .098″. From this it will be seen that the band has an expansive power of about .060″ or slightly more than four points.

Spacebands are made in four thicknesses: extra thin, thin, thick and extra thick. For general composition, either thick, thin, or extra thin spacebands are used, in the discretion of the typographer. Extra thick or "jumbo" spacebands are used in display composition. Extra thin spacebands were used in the composition of this book. They are best for small type composition and narrow measures.

The two outside surfaces of a spaceband are always parallel. The two inside surfaces are tapered and the long wedge slides against the short sleeve. They are supported in the machine by lugs or ears at the top of the short slide or sleeve. Spacebands have no combination teeth.

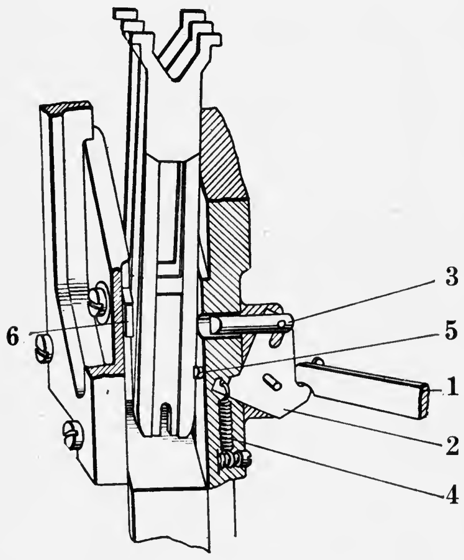


FIG. 17

FIG. 17.—The spaceband key lever *1* has depressed releasing pawl *2* which causes releasing plunger *3* to be withdrawn from the front of the spacebands. The spacebands slide forward until the first one banks against banking pin *5*.

Spaceband Box

The Release of a Spaceband.—The action taking place to effect the release of a spaceband is as follows:

The key lever *1*, Fig. 16, rocks the pawl *2*, which in turn withdraws the plunger *3* from in front of the spaceband and against which the band has been resting. The first spaceband slides forward and stops against banking pin *5*, and directly in front of the end of the releasing plunger *3* which has retreated into the back plate of the box. The pressure of lever *1* against pawl *2* is now released by the action of the keyboard parts, and releasing pawl spring *4* pulls the pawl *2* back into normal position. This, of course, causes plunger *3* to push the lower end of the spaceband toward the front plate of the spaceband box, from which point it drops by gravity into the chute for delivery into the assembling elevator.

Spaceband Box Troubles

The Intertype spaceband box under normal conditions, gives no trouble of any kind. Occasionally, excess oil in the vise justification apparatus or the assembler bearings will foul the lower ends of the long wedges. Naturally oil and graphite will form a gummy accumulation in the "floor" of the box and interfere with timely dropping of the spacebands. In case they do not slide forward promptly, clean the floor of the box. This can be done without removing the box from the machine. Use a cloth saturated with high test gasoline or benzol fashioned into a swab on the end of a slender stick of wood or a matrix hook.

When the releasing plunger retreats into the hole in the back plate of the box, it must clear the edge of the hole and on coming back into normal position the point of the plunger must advance a little ahead or beyond the end of the banking pin so as to throw the spaceband clear of the banking pin. In order to obtain these two conditions of the forward and back strokes of the releasing plunger, first give attention to the back stroke.

FIG. 18.—The spaceband key lever *1* has made its downstroke and now rises to normal position. This permits spring *4* through connection with pawl *2* to force releasing plunger *3* against the side of the spaceband, the lower end of which has fallen forward against banking pin *5*, forcing the lower end of the spaceband clear of the banking pin *5*. The adjusting block *6* prevents the second spaceband from delivering through friction.

There is just room enough for one spaceband to be released over the end of the adjusting block.

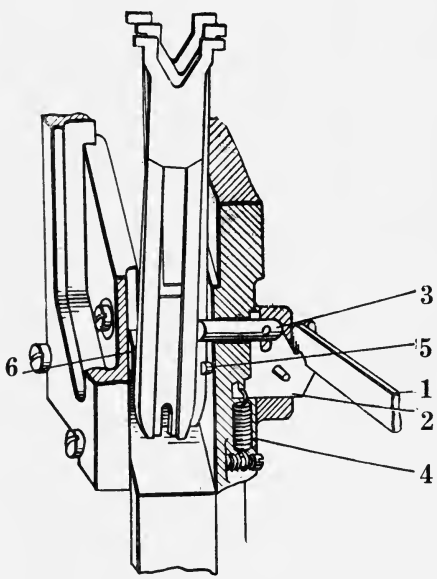


FIG. 18

Remove the spacebands from the box, throw off the keyboard belt, depress the spaceband key and turn the rubber roll shaft slowly by hand. When the spaceband cam yoke has reached its highest stroke and the key lever is at its lowest point, see if the end of the plunger clears the hole in the back plate. A groove cut in the rubber roll under the spaceband cam will prevent the pawl from making its full stroke.

It will be noticed that when the key rod lever is standing in normal position, it has some lost motion. This is intentional for the reason that the releas-

ing plunger in the box is thus permitted to make its full stroke toward the front of the spaceband box.

If the stroke of the lever does not cause the pawl to clear the edge of the hole in the back plate of the box, the lever can be bent slightly to cause it to do so, but first see that the rubber roll is full diameter and round under the spaceband cam. If bending the lever is necessary, bend it only enough to accomplish the required adjustment. Too much of a bend will set up a strain at high stroke of the spaceband cam and cut a groove in the rubber roll.

The spaceband key lever key rods now applied are made in two pieces and contain an overmotion spring like the regular key rods. The spring provides a cushion so that there will be no undue strain upon the rubber roll at the extreme upstroke of the key rod.

A loosened rivet in the lower edge of the long wedge will cause hesitating delivery.

A slightly bent spaceband cannot be released because it will not be positioned in front of the releasing plunger.

A sleeve or short wedge that binds in the top of the long wedge, due to accident will cause hesitating delivery from the box. Sleeves must slide freely the entire length of the spaceband or groove in the long wedge.

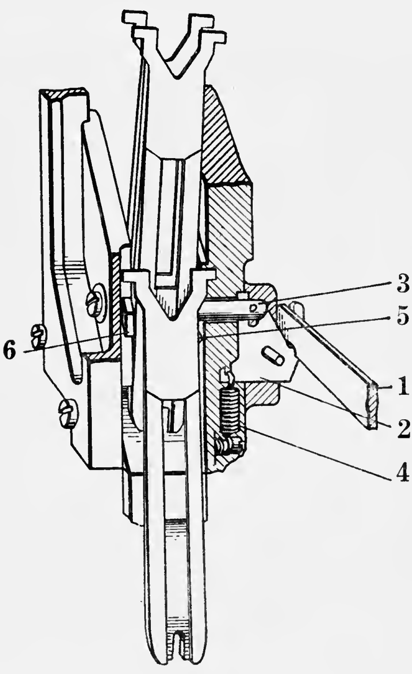


FIG. 19

FIG. 19.—The spaceband now falls by gravity into the spaceband box chute and from there into the assembling elevator. The other spacebands in the box rest in position as shown in Fig. 16.

After a long period of use, the top rails and angular guide block in the upper plate may possibly have notches worn in their faces where the lugs of sleeves pass. Stone out the notches.

Adjusting the Spaceband Box Plate for Various Thicknesses of Spacebands.—The adjusting plate *6*, Fig. 16, is movable to prevent the delivery of more than one spaceband at a time, that is, it partly covers the second spaceband so that it cannot start to slide out due to friction when the first one is being pushed towards the front plate of the box. This plate is also movable so that it can be adjusted to accommodate spacebands of different thick-

nesses. Adjustment of the plate is made by turning the rubber roll shaft slowly until the releasing plunger has made its full back stroke and the first spaceband has fallen against the banking pin *5*. Stop the rotation of the rubber roll shaft and loosen the plate screw. Adjust the plate until it covers about one-half of the second spaceband, then tighten the screw.

The center bar is located at the top of the box, suspended by a bracket over the spacebands. This bar helps guide the bands down into proper position, or deflect the tops, should any of them have a tendency to slip from the top rails. There is no adjustment for the bar.

Spaceband Box Removal

To remove the spaceband box from the machine, pass all the bands into the transfer channel or lift them out. Shut off the controlling lever. Back the machine until the second elevator is resting on the safety hook. Trip the delivery slide lever. Trip the spaceband transfer lever by depressing the transfer slide releasing lever and the safety catch at the left of the transfer slide and let the transfer and spaceband levers come together in the transfer channel. The reason for moving the spaceband transfer lever pawl into the transfer channel is to hold up the pawl so that the pawl spring will not drop out after removal of the box.

One large screw in the spaceband box back plate holds the box in position on the face plate. Take out this screw and lift off the box. When removing the box be careful not to kink or twist the ends of the top rails where they fit into the transfer channel.

Lubricating First Style Releasing Pawl Spring

For a time spaceband boxes were provided with a releasing pawl spring of the compression type, working in a pocket, and with a small pilot plunger between the spring and pawl. This device requires occasional lubrication and it is necessary to remove the box in order to put a small grease pill inside the spring coils. Once in six months remove the box from the machine and put the pill of graphite grease within the releasing pawl spring coils. This will provide sufficient lubrication to keep the parts working smoothly.

The new style releasing pawl spring is of the tension type, shown at *4*, Fig. 16. It should have sufficient tension to throw the lower end of a spaceband from the banking pin to the front of the box so the spaceband can drop of its own weight. An occasional drop of oil on the releasing pawl pivot is essential.

Spaceband Box Top Rails

The top rails must fit neatly against the transfer channel front and back plate so they will not obstruct the free passage of spacebands into the box. Remove the box so as to fit the rails properly in case they have been twisted.

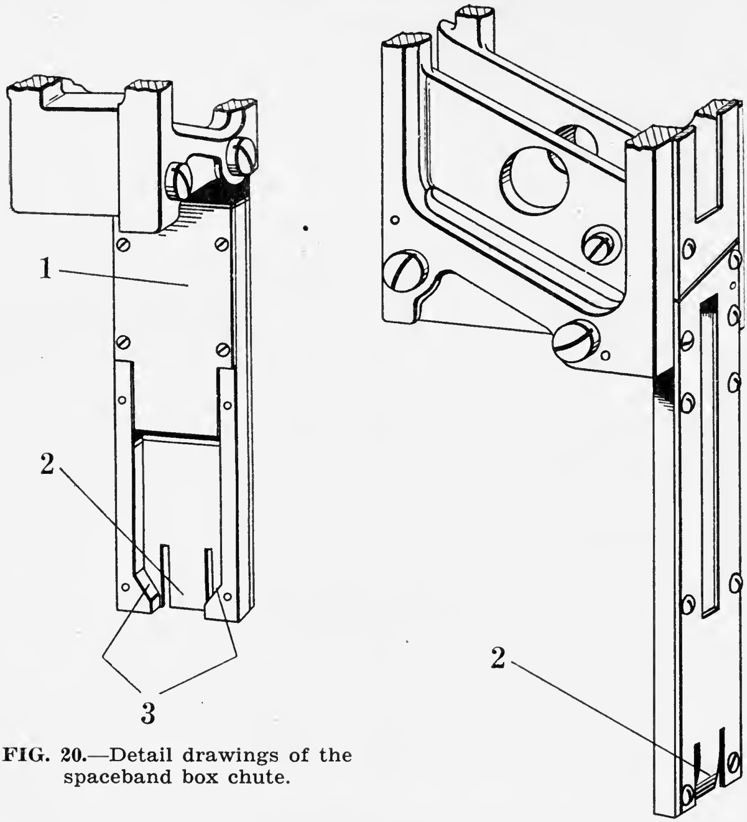


FIG. 20.—Detail drawings of the spaceband box chute.

Spaceband Box Chute

The spaceband box chute has a plate *1,* Fig. 20, the lower lip of which can be bent in or out to accommodate various thicknesses of spacebands. If regular thick bands are in use, it is best to adjust the lower end so it will be even with the side pieces of the chute.

There is a lip in the lower end of the spaceband box chute *2,* for the same purpose. Instructions in the above paragraph apply.

Looking into the lower end of the chute at *3,* it will be noticed that the side pieces are beveled. After long use spacebands may wear off the receding bevel, which is intended to crowd spacebands against the long chute plate to the right of the chute. Take the chute apart and stone the bevels to original slope.

Polishing Spacebands

During every eight-hour run or fraction of that time, it will be necessary to polish the spacebands on a pine board having graphite sprinkled over its surface, for two reasons: First, to remove a small oxide stain on the sleeve

at the casting point, and second, to provide lubrication for the long sliding wedge of the spaceband so as to reduce friction between the sleeve and the wedge, and the matrices.

A pine board about one foot long and six or eight inches wide is suitable. Renew the board when a slight depression shows from the rubbing of the bands. The board can be mounted in a box for cleanliness.

The stain or oxide accumulating at the casting edge of the sleeve must be removed. First scrape off any metal that may have adhered at this point. Use a piece of brass rule. Tools made of harder metal should not be employed for this purpose as they will injure the face of the sleeve.

Use Dry Graphite to Polish Spacebands.—Whether the spacebands are polished by hand or by one of the machines now on the market, use nothing for the polishing medium but Dixon's No. 635 dry graphite. Other polishing agencies have been experimented with in the past, but graphite is the best for the purpose. Shun powdered soapstone, flour of mica and other so-called polishing compounds. These have their proper uses but are not suitable for polishing spacebands. Rest assured that the Intertype Corporation, with its experimental department constantly searching for new methods and devising new ways and means of improving the machine it makes, will announce any process that will help to better its product.

Always return spacebands to the machine with the short sleeve turned to the right.

Chapter VII

ASSEMBLER ENTRANCES

The assembler entrance, like other parts of the Intertype, has been improved as the necessity for increased capacity has demanded, or a new feature has been found to improve the action of the machine.

The assembler entrance represents a means of guiding matrices from the magazine to a common point in the assembler and is the connecting link between the parts.

The entrance consists of a plate, to which are fastened twenty-eight guides which prevent the matrices twisting as they drop from the magazine to the rapidly traveling belt which conveys them to the assembler proper.

Equipments A, B, C and D are all provided with the same type assembler entrance. Intertype E has its own double entrance which will be described later.

The First Assembler Entrance has a two-piece plate. The guides are fastened to the plate by means of eye extensions, these latter passing through slots in the plate and suitable locking rods inserted in the eyes at the back to hold them rigidly to the plate. Some of the longer guides at the left-hand lower side are anchored with lugs entering split nuts in the plate.

This first assembler entrance has full-shaped guides—that is, the guides are full and round at the top. The lower ends are not equipped with extremely thin extensions or "feathers." The tops should have knife edges so as to offer the least obstruction to matrices passing from the magazine. The lower ends should be slightly curved toward the star wheel so that in falling, matrices will be deflected from a vertical position and strike the matrix belt obliquely.

Special attention should be given assembler entrance guide No. 1 (the longest of the group) just under the chute spring or finger. The lower end of this guide should be so curved with the pliers that the thickest capital W used on the machine will pass at *1,* Fig. 21, under it without much clearance. Giving this small amount of attention to the guide will help wonderfully in preventing matrices jumping out of the assembler.

The Matrix Belt 3 should have enough tension to eliminate all whip or looseness. The idler pulley *2* is adjustable for this purpose. Loosen the nut *4* shown in the small detail drawing, and move the stud up in its slot, then tighten the nut. The matrix delivery belt supporting plate *5* should be perfectly straight. It should not interfere with the free motion of the belt. The plate is slightly adjustable for clearance with the belt. Occasionally, the extreme ends may become bent and interfere with the belt, causing it to drag. Straighten the supporting plate ends with pliers.

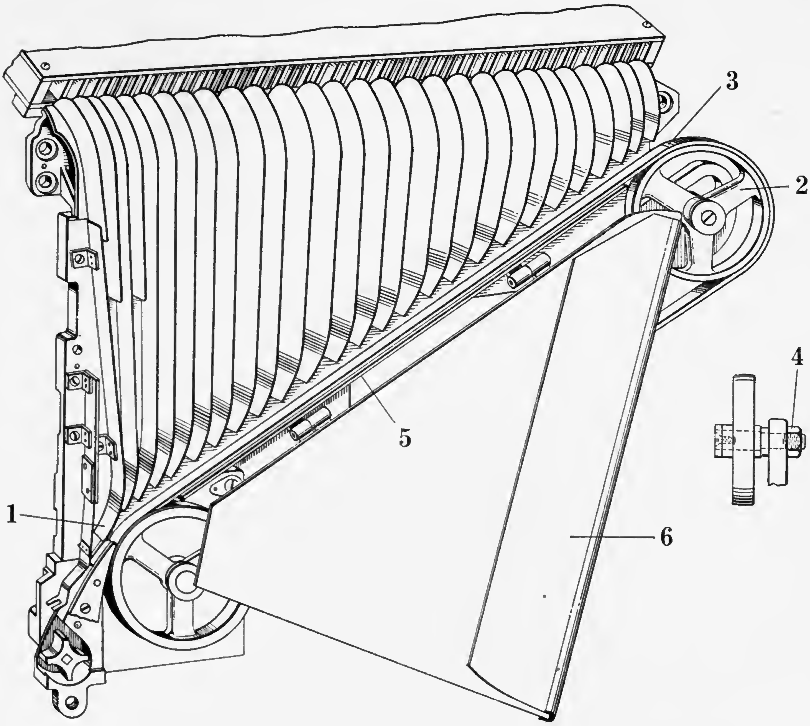


FIG. 21.—First style assembler entrance.

If a matrix from any of the last few magazine channels drops through between the belt and the entrance cover, bend the last entrance guide upwards and to the left a little to give support. This will also deflect matrices properly to the belt.

Give the assembler entrance and inner side of the cover a thorough cleaning once in a while. Use a cloth saturated with high test gasoline or benzol fashioned into a swab on the end of a stick.

There is a thin spring metal piece or plate fastened at the top of the assembler entrance cover, called a spring cushion, shown at *6*, Fig. 21. This provides a springy banking against which matrices strike immediately after leaving the magazine. After several years this spring cushion should be replaced, owing to the fact that the matrices will wear little grooves or dents in the cushion and sometimes cause transpositions. Replacement is the only remedy, since trying to flatten out the hollow places from the opposite side will buckle the metal around the dent, and thus cause even greater troubles.

Removing First Style Guide.—Owing to carelessness or accident when working around the machine, a guide may need replacing. In this event any guide can be removed by withdrawing the two locking wires to the right at

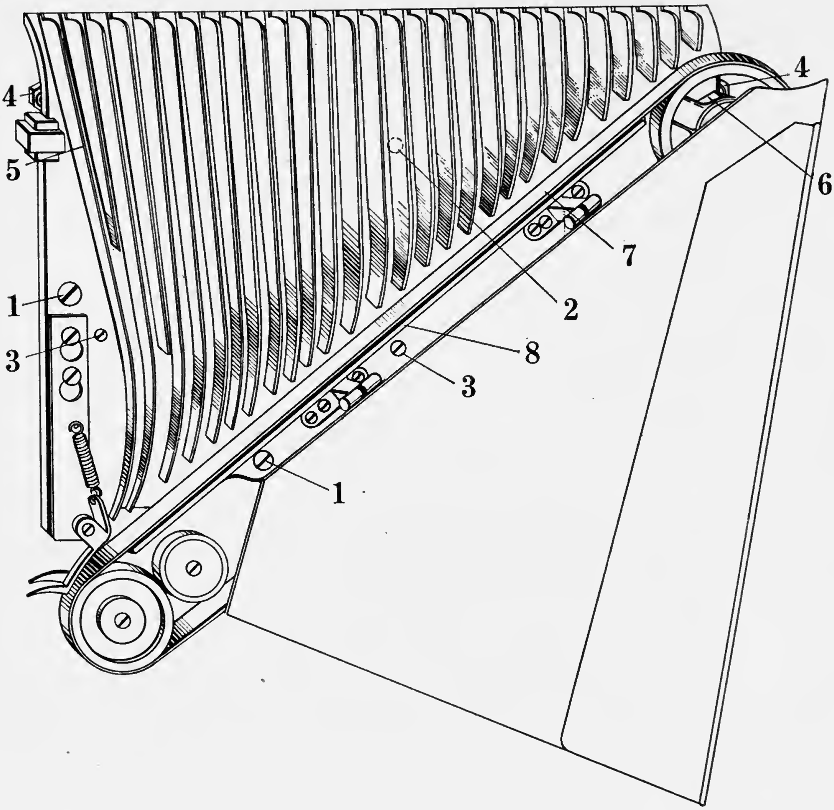


FIG. 22.—New style positive assembler entrance.

the back of the entrance plate, which will permit the guide to be taken out.

If it is necessary to remove the entire assembler entrance, tilt back the magazine frame, remove the chute spring and plate, throw off the assembler belt, disconnect the spaceband key rod from the key rod lever by taking out the eye pin and unscrew the spaceband box lever stud or pivot. About half way between and just above the matrix delivery belt there is a blind screw (no slot in the head) and a slotted nut, which can be reached and turned out by passing a screw driver between the key rods from the rear, and after the nut has been taken off, the screw can be pushed toward the front from the rear of the plate. The main screws can now be removed, two at each side at the top and two in the lower part of the plate.

New Style Assembler Entrance—A, B, C and D

The new style assembler entrance has one plate to support the partitions or guides, instead of two, as in the first style entrance.

The method of fastening guides to the plate is the same—locking rods passing into eye extensions projecting through slots cut in the plate.

Adjustment of New Style Assembler Entrance.—The plate is mounted on a sturdy iron frame. The entire entrance is adjustable in relation to the magazine by means of screws *3* and *3'*, Fig. 22. The adjustment can be made by loosening screws *1, 1'* and *2;* screw *2* can be loosened by passing a screw driver between the key rods from the rear of the assembler entrance plate. Then turn screws *3* and *3'* until the top edge of the plate is a trifle below the beveled edge of the magazine lower channel plate. If positioned too low in relation to the magazine, matrices will not drop sharply as they leave the magazine, and it is obvious that if the top edge of the assembler entrance plate is too high in relation to the magazine it will obstruct the free passage of matrices. On three-magazine machines a general average can be found so that the entrance plate will be positioned below the lower channel plates of all magazines. The three anchor screws *1, 1'* and *2* can now be tightened.

Screws *4* and *4'* are intended to serve as supports for the top part of the assembler entrance guide plate and do not require adjustment after the machine has left the factory.

The upper ends of the partitions have been cut away so as to leave a small portion of the guides extending toward the magazine. This permits the free passage of large-bodied matrices. The ends of the guides are slightly adjustable sidewise to provide clearance for thick matrices.

Some assembler entrances have been applied with guides having thin metal extensions or "feathers" fastened to the lower ends. These extensions are flexible and direct the matrices to the belt. If an occasional feather should become cracked or broken the matrices passing by that particular guide will perform funny antics and a new feather can be soldered on, or a new guide put in. The feathers should be curved slightly in the general direction of the star wheel.

Adjustment of the Matrix Belt.—The matrix belt is adjusted for tension by means of the nut at the rear of the idler pulley stud *6*, Fig. 22. The nut should be adjusted so as to eliminate all whipping motion of the belt.

Occasionally use high test gasoline or benzol to clean the belt supporting plate and the entrance guide plate, as well as the inside of the cover.

See that the matrix delivery belt supporting plate *8* is not positioned so high as to drag the belt *7*.

E-s.m. Assembler Entrance

The assembler entrance on the E machine consists of two distinct parts, upper and lower entrances; one each for the two main magazines, converging to a common point above another or vertical entrance where matrices from both magazines pass on their way to the assembler. The two upper entrances are fixed as to position and are not adjustable. The vertical or lower assem-

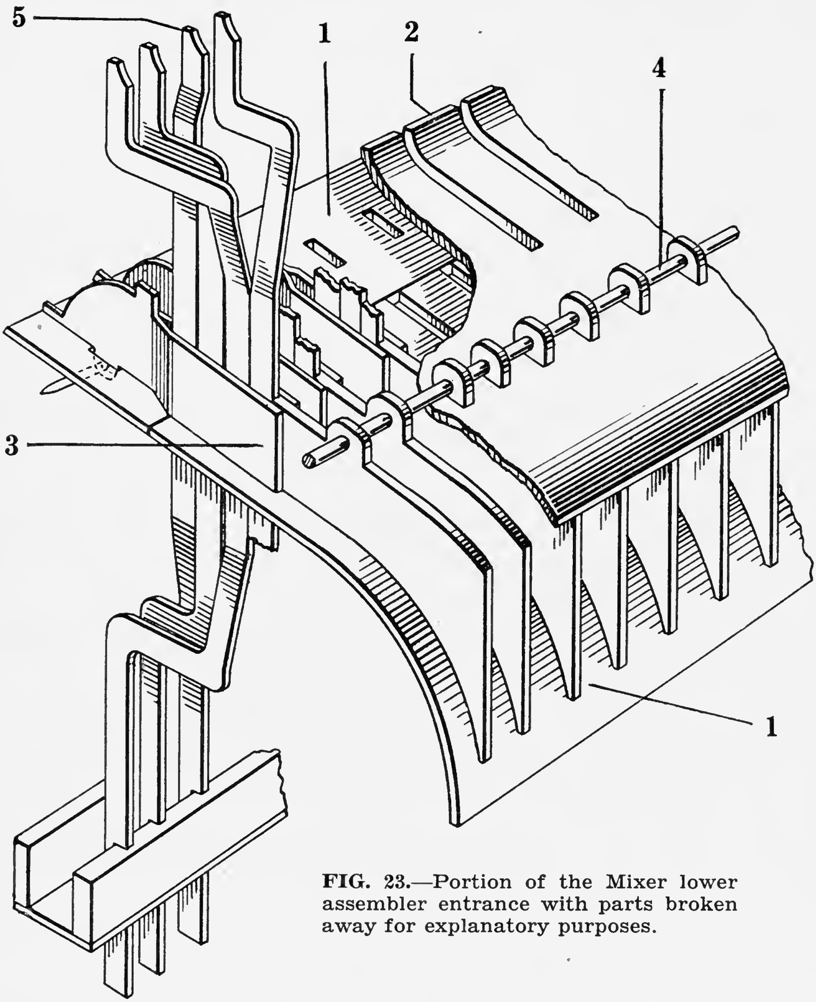


FIG. 23.—Portion of the Mixer lower assembler entrance with parts broken away for explanatory purposes.

bler entrance is adjustable to be in line with the two upper entrances and when once set the adjustment is permanent.

The upper magazine escapement rods pass through slots in the lower assembler entrance. The rods which operate the upper magazine escapements are set far enough away from the lower magazine so that they do not interfere with any of the matrices coming from the lower magazine.

The Mixer assembler entrances require occasional treatment so that matrices will pass unhesitatingly through the entrance channels after leaving the magazine.

In Fig. 23 a portion of the lower assembler entrance is shown. Along its upper edge at *2* the lower assembler entrance top plate is slotted at intervals throughout its width, and the escapement rods *5* for the upper magazine extend upwards from these slots which permits free removal and replacement of the top plate after the locking rod *4* has been withdrawn.

The edges *2* of the lower assembler entrance upper plate should be slightly curved upward to prevent matrices striking them as they pass.

Cleaning the Entrance.—If necessary, clean the lower assembler entrance plate *1* between the guides *3* so that any gummy accumulation which might retard the speed of matrices will be removed. A wiping cloth fashioned into a swab on the end of a wooden stick, saturated with high test gasoline or benzol may be used for this purpose.

The lower assembler entrance upper guides indicated at *3* are split at the lower end to form a protective sheath against matrices striking the escapement rods *5*. The split part of the upper guide must not become bent so as to

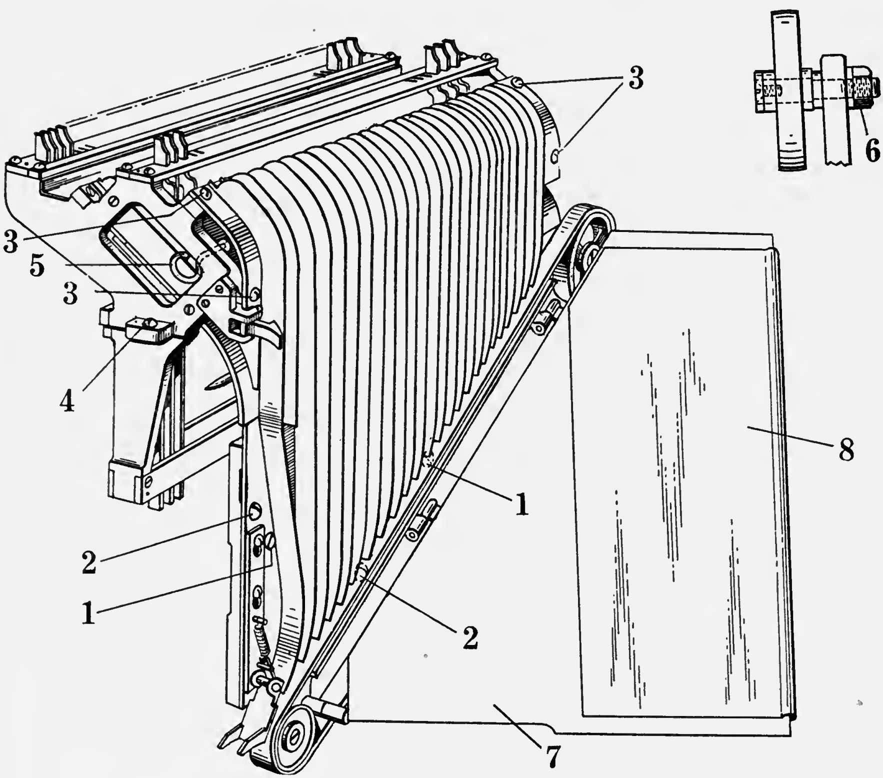


FIG. 24.—Mixer assembler entrance.

obstruct the free passage of matrices. Careless use of a screw driver in removing clogged matrices can spring or distort the split part of the guide.

The lower or vertical entrance plate is slightly adjustable for in or out position in relation to the upper entrance by means of the two screws *1* and *1,* Fig. 24. Before adjusting them, however, loosen the two plate binding screws *2* and *2,* and a third screw which can be reached with a screw driver from between the keyrods at the back. The adjustment is correct when the upper edge of the lower assembler plate is in line with the lower edge of the assembler entrance. This adjustment is usually permanent when once it has been made.

Removing Mixer Assembler Entrance.—Should it become necessary to remove the assembler entrance from the machine at any time for the purpose of repairing or replacing an escapement rod, or because one of them has become twisted, proceed as follows:

Throw the channel entrance auxiliary stop and lower the entrance, tilt the magazine back to change position; disconnect spaceband box lever guide from the lower end of the escapement rod frame; take off assembler entrance cover *7,* Fig. 24. Turn out the four screws, *3333* in assembler entrance upper plate, and lift the plate off, being careful to gently disconnect the lugs in the lower ends of the first fourteen guides from their slots in the plate. The balance of the entrance can be lifted off after taking out screws *4* at each side of the entrance frame.

The lower entrance upper plate is removed after withdrawing locking rod *5.* There are no complications when removing the plate, simply lift it off. Any escapement rod for the upper magazine may be lifted out for repairs or replacement, or any of the guides may be removed by withdrawing the necessary locking rods from the guide eyes at the rear of the plate.

Remove the entrances in case a lower magazine escapement rod needs attention or replacement.

Occasionally, clean the assembler entrance on the machine with a cloth wrapped around a stick and saturated with high test gasoline or benzol.

On E machines, the matrix delivery belt is adjusted for tension in the same manner as on the other machines, that is, by means of an adjusting nut at the rear of the idle pulley stud. Shown at *6,* inset drawing, Fig. 24.

Mixer Side Magazine Assembler Entrance

The side magazine assembler entrance on E machines, with suitable modifications, is similar in all respects to the main entrance.

The assembler matrix delivery belt from the side magazines to the star wheel is continuous. The tension of the belt may be adjusted by a nut on the idle pulley stud at the extreme right of the machine.

In case the necessity ever arises, the entrances may be removed from the machine by taking off both side magazines; take off matrix delivery guard; turn out the four screws (two each side) which hold the upper entrance plate

in place; then unscrew the four screws (two each side) that hold the entrance frame to the machine.

Upon replacing the upper assembler plate for the side magazine, it will be noticed that the guides have round eye extensions at the rear. Hold the plate in a slightly tilted position and work the eyes into the lower entrance plate slots one at a time. The eyes will enter the slots easily in this manner.

Chapter VIII

THE ASSEMBLER

Matrices passing through the assembler entrance, as previously explained, are deflected by means of nearly vertical guides to a rapidly traveling belt which carries them to a converging point in the assembler chute, where they pass over a star wheel into the assembling elevator. Here they rest upon a common level with the spacebands interposed, which have dropped through a chute directly above the star wheel.

It is the purpose of the assembler, by means of the star wheel and chute spring, to throw matrices and spacebands into the assembling elevator to an upright position in their proper sequence. Constant study upon the part of Intertype engineers to improve the assembling apparatus so as to minimize all chances of error in the assembling of matrices has brought about a precise and dependable mechanism.

Spring Chute Rail Assembler

The first type assembler furnished has thin spring rails in the chute. Matrices pass by gravity and momentum from the instant of leaving the matrix belt until they come in contact with the star wheel, a distance of about three inches. Matrices from the first few magazine channels fall directly upon the spring chute rails and receive no impetus from the matrix belt, in passing through the chute.

If the springs in the chute rails become worn thin at the upper ends, new springs can be soldered to the rails. The upper ends of the springs should fit closely to the matrix belt so that thin matrices cannot wedge between the rail springs and the belt. The lower ends of the assembler entrance guides are curved towards the star wheel, shown at 7, Fig. 25, so as to deflect matrices to the belt and aid in affecting smooth assembling.

Additional general instructions for the care and adjustment of this assembler are the same as for the flanged-pulley assembler.

Flanged Pulley Assembler

A second assembler was designed later on to shorten the space in the chute between the matrix belt and the star wheel so that matrices would receive the benefit of added motive power just before engaging the star wheel, and the shock due to falling by gravity might be further reduced. This assembler is distinguished by a flanged pulley, shown in Fig. 25. The belt runs between the flanges on the pulley rim, and the spring chute rails are replaced by a short, flat plate, curved to fit the contour of the chute. This device short-

ened the chute rail space about one-half inch, and was used until development to the belt and aid in affecting smooth assembling.

It is essential that assemblers equipped with the flanged belt pulley *9*, Fig. 25, have a matrix delivery belt which is in fairly good condition, so that the thickness of the belt *2* will bring the top edge about even with the pulley flanges. Also see that the lower ends of the assembler entrance guides at *7* are curved toward the left so as to soften the impact of matrices on the belt and the pulley.

The assembler may be removed from the machine by turning out the two screws shown at *1*.

On this assembler, Fig. 25, adjust the chute plate *4* by loosening the screws *6* and *6*, and move the bracket *5* until the space between the heel of the plate and the chute rail will permit the free passage of matrices without choking. At the same time the points of the plate *4* should be positioned out as far possible to a point which will permit the assembling elevator pawls to

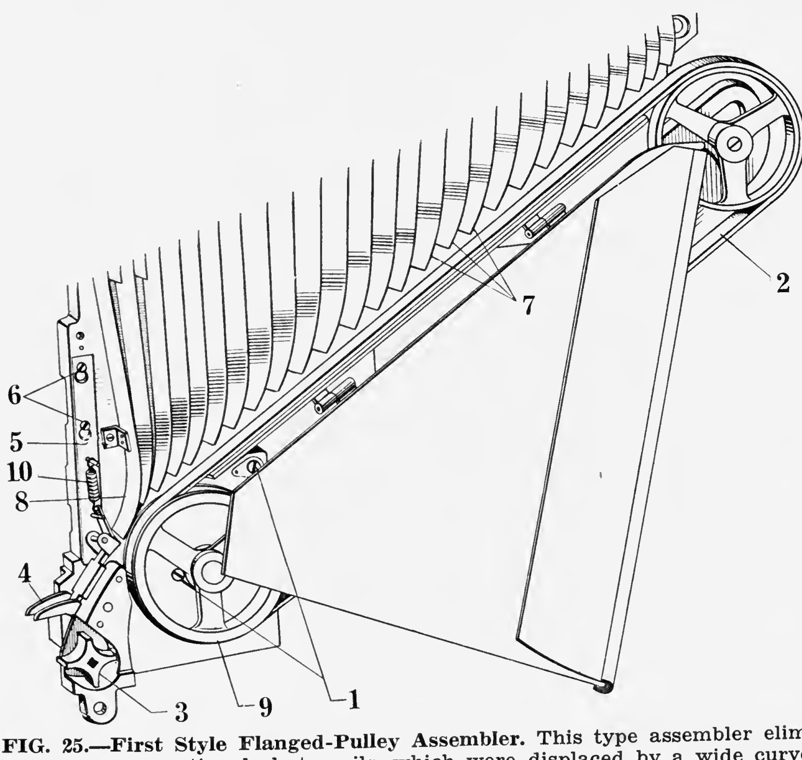


FIG. 25.—First Style Flanged-Pulley Assembler. This type assembler eliminated the conventional chute rails, which were displaced by a wide curved plate extending from the matrix belt to the star wheel. The "dead space" between the belt and the assembler star was shortened about one-half inch, which greatly improved matrix assembly.

pass without interference. If the setting between the plate and the chute rail is too wide, thin matrices will have a tendency to bound out of the assembling elevator.

In setting the plate *4* bear in mind that it acts as a buffer for matrices against the stresses of the assembler star and should be set low enough to make matrices settle down in the assembling elevator.

The flanged-pulley assembler chute plate spring *10* is the same as that used for the magazine escapements (W-897). It is not advisable to use just any kind of spring for renewal purposes. Use the magazine escapement spring and see that its tension is rather strong.

The first assembler entrance guide, indicated at *8*, should be bent down toward the chute rail so that the space between the guide and chute rail will just permit free passage of the thickest matrices.

The Positive Assembler

This assembler does away with the "dead space" between the lower end of the matrix delivery belt and the assembler star. Unlike the two preceding types of assemblers, the matrix delivery belt, which is wider than the first style, occupies the space in the chute formerly taken up by the fixed chute rails. This eliminates the traveling of matrices by gravity or momentum through the narrowed chute above the star wheel, and matrices are virtually pulled from between the belt and chute finger in a positive manner.

This Intertype development increases the speed of assembling, eliminates clogging of matrices in the chute and greatly minimizes transpositions. Another advantage lies in the fact that a 36-point capital "W" matrix from one magazine will pass the chute finger as positively as a period matrix from another magazine. One setting of the chute spring is satisfactory for use with all fonts in the machine. Overlapped matrices, due to rapid operating, clear the chute, and are pulled through without manual assistance.

The shafts of the first positive assembler, were equipped with ball bearings. Some of the pinions are micarta and the whole power-transmitting device is noiseless. The assembler star shaft runs in a bronze bushing channeled with graphite. This bearing should be oiled weekly with but one drop of oil applied in the hole located at the top of the assembler, just at the right of the lower end of the spaceband box chute. This hole also supplies oil to the assembler intermediate gear shaft through a duct.

Maintenance of Ball-Bearing Assembler.—At long intervals, the assembler should be taken from the machine to clean the parts and supply new vaseline to the ball bearings. Set the assembler slide for 30 ems, take off the pulley screw and washer, *14*, Fig. 26, throw off the matrix delivery belt *2*. The assembler can then be taken off upon removing screws *1* and *1* which hold it to the face plate. Avoid using gasoline or any cleaning fluid in the bronze, graphite-channeled bearings. Simply wipe them out with a clean cloth.

Adjustment of Chute Spring.—The chute spring is adjusted as follows: In Fig. 26 set the plate *4* so there will be about 10 or 12 points space between the heel and the running belt *2* at the place where the bridge points *7* join the belt. The prong points of the plate *4* should align vertically with the assembling elevator gate pawls. Loosen the screws *6* and *6* and move the bracket *5* to make the adjustment. The chute plate spring *16* is much heavier than the one used in the first type assembler.

In case it is necessary to remove the assembler for repair, lift off the chute plate *4*, Fig. 26, and the plate spring *16*. Set the assembler slide for 30 ems, depress the latch *8* and swing out the bracket *10;* throw off the matrix belt, remove the set screw in the pulley, take out the screw and washer *14* and take the pulley from its shaft. The two screws *1* and *1* can now be turned out and the assembler taken from the machine.

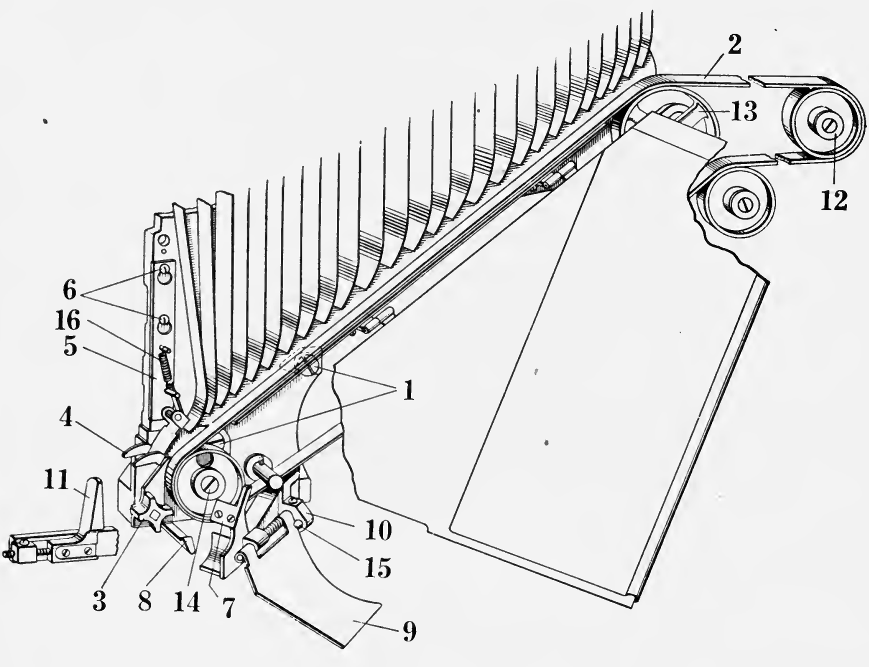


FIG. 26.—New Style Positive Assembler now applied to all Intertypes. Matrices do not depend upon gravity to reach the lower end of the chute spring *4*, but are caused to pass from under it by the rapidly moving belt.

This view also shows the means provided for the quick renewal of the assembler star *3*. Open the assembler chute cover *9* so it will be held down by the detent *15*, raise the assembling elevator enough to clear the end of the chute block, depress the spring latch *8* and swing out the hinged chute block *10*. The old assembler star may then be removed and a new one substituted. Assembler stars can always be kept in first class condition because of the simplicity of making the renewal.

If the top of the chute cover *9* extends farther in than the lower edge of the large cover, matrices will strike it and transpose in the assembler. The lower edge of the large cover should be even with, or a little farther in, than the top of the small assembler chute cover *9*.

Adjustment of the Matrix Belt.—The pulley *12* on side magazine machines, is adjustable for belt tension by means of a nut at the rear side of the bracket. The pulley *13*, on machines without the side magazine unit, is adjustable in the same way to take up slack in the matrix belt.

A detent *15* holds the chute cover *9* down and out of the way when it is desired to open the cover.

Adjustment of the assembler slide for proper em length, by moving the finger *11*, Fig. 26, is explained under the heading "Setting the Assembler," and by Fig. 32.

Star Wheel Tension

The tension of the star wheel friction spring should be strong enough to just throw em quad matrices into the assembling elevator at a rapid rate of speed and without hesitancy; on the other hand, the tension should not be so great as to cause the assembler slide finger to advance more than the thickness of each quad as it is being assembled, or cause matrices to bound out from the assembling elevator. Learn to judge the spring tension by thrusting a finger against the assembler star while it is revolving under power. The tension may be weakened by squeezing the spring in a vise; if it requires strengthening, gently tap it with a light hammer while rolling the spring on a corner of an iron block or vise. Put some grease between the brass friction disk and the pinion into which it fits.

The star wheel shaft has a small frictional driving arrangement shown in detail, Fig. 27. This device is applied to furnish proper resiliency when the

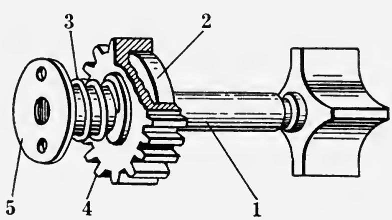


FIG. 27.—Assembler Star Shaft Assembly. The steel shaft holding the star is indicated at *1; 2* is the brass friction disk screwed upon the shaft *1; 4* is the pinion which meshes with an intermediate gear from which it receives its motion. The pinion fits over the brass disk *2* and is not supported by the shaft *1; 5* is the nut screwed upon the end of the shaft *1;* a spring *3* is placed between the nut *5* and the pinion *4* so that, in the case of an overset matrix line, the star will stop, the spring permitting the pinion *4* to continue revolving by slipping against the brass disk *2*, which, with the star upon the shaft *1* is held stationary, until the obstructing matrix has been lifted from the assembling elevator.

star wheel engages the matrices. A fixed motion of the star wheel here would throw matrices out of the assembling elevator. In order to get at the parts it will be necessary to remove the assembler.

Star Wheel Removal

A star wheel may be said to be worn out when it will not flip matrices to a vertical position in the assembling elevator. The corners of the spokes round off before the center part, owing to the fact that the sides of matrix bodies are hollow-milled. There is also a tendency for matrices to assume a position out of true or at an angle to the parts while being assembled. The star wheel will need renewal when worn about one thirty-second of an inch.

A star wheel may be removed from the spring-rail and the flanged-pulley types of assembler by taking off the chute cover and its spring; turn out one screw in the front chute rail and lift off the rail. The star wheel will then be accessible for removal from its shaft.

To remove a star wheel on the new style positive assembler, set the assembler slide adjusting block for 30 ems, raise the assembling elevator, open the chute cover *9*, Fig. 26, depress the spring latch *8*, when the bracket *10* may be swung out on its hinge, exposing the star wheel. The old one may be slipped off and a new one put on.

If necessary, dress the hole and clean out the corners with a square file, so that the star wheel may be pushed on with the fingers. *Never drive a new star wheel on the shaft,* as this may result in damage to the shaft bushing.

Proper Assembler Maintenance

A loose round assembler driving belt will give the effect of a weak star wheel friction spring. Tighten the driving belt, if too loose.

A star wheel shaft that is running in its bearing without oil will give the effect of too strong tension of the friction spring.

Careful Lubrication is Essential.—Too much oil applied to the assembler bearings will foul the matrices and cause trouble with free dropping from the magazine after the oil has been transferred to matrix lugs and by them to magazine channels. Use a small, short-spout oil can and lubricate weekly with one small drop in each bearing. Use a medium grade of machine oil.

If the bell hammer pawl *9*, Fig. 29, is not slightly lubricated with grease, an effect will be produced equal to a weak star wheel spring tension at the point where the pawl engages the bell hammer trip.

Assemblers are equipped with bushings for the matrix belt pulley shafts. After having been run a long time, new bushings may be applied, if the old ones permit the shafts to cause the pulleys to run out of line. Grasp the pulley and shake it to see if the bushing hole has become enlarged through wear. The old bushing should never be pounded out. An old bushing may be pushed out by putting a roller having a large hole, back of the plate and over the bushing hole, starting it by squeezing a round pin directly against the front

end of the bushing between large vise jaws. A new bushing can then be inserted in the assembler by squeezing to place between the bench vise jaws.

Careful Spacing Necessary.—The assembler is provided with means of adjustment so that matrices cannot be damaged in the vise jaw lockup. Take advantage of this device. *Never put more matrices in a line than will go in freely and still permit the star wheel to turn slightly.* If the office style calls for close spacing use extra thin (.030″) spacebands.

The spaceband buffer finger *15*, Fig. 29, may have a depression worn at the right side under the assembling elevator where the spacebands first drop down upon it. In this case spacebands may fall down when the assembling elevator gate is opened to make corrections in the matrix line. The buffer should be replaced when badly worn.

Chapter IX

THE ASSEMBLER SLIDE

First Style Assembler Slide.—The first style assembler slide, Fig. 28, is equipped with a bar, on the front side of which holes are located, one for each em measure from four to thirty, and a scale above designates the measure corresponding to each hole.

The measure is set by pulling out a small knob in the adjusting block and sliding the block along until the plunger registers with the hole corresponding to the desired measure. Turning the knob half way enables half-em measures to be set.

The motions of the slide are as follows: Upon raising the assembling elevator, the lever *1* under the elevator at point *3* is also raised, and a brake operating pin (not shown) at the right side of the lever at *8*, presses down on the lower part of the brake thumb piece *2*, releasing the brake blocks from the slide. This permits the spring *6* to return the slide against the stop *12*, ready for the next line of matrices.

When the assembling elevator seats again, it bears down and rests upon the operating lever *1* at point *3*. This action causes the brake blocks *18* and *19* to grip the assembler slide.

The assembler slide measure is adjusted to correspond with the vise jaw setting by the screw *7*, which banks against the chute block when the line is full. A small red sight piece is mounted at the top of adjusting block to indicate to the operator when the measure is nearly filled with matrices, just how much space remains so that he can divide a word or thin-space the line.

Never put oil on the assembler slide, but keep it clean and rubbed with dry graphite to insure its free action. Oil will cause the slide to vibrate for the reason that the fibre brake blocks can not grip the slide. After a short time the oil will become gummy and the slide will then act very sluggish.

Occasionally, remove the assembler slide from the face plate by disconnecting the slide and link at *9* and removing the screws *10*. The bracket upon which the slide is mounted may then be taken from the machine. At this time clean and oil the roll *4* and the recess under the gib *11*.

When the assembling elevator is resting in normal position, there should be a little play between the operating lever pin, held in place by the nut at *8*, and the brake thumb piece *2* so as not to hold the brake away from the assembler slide. Raise the elevator slightly and shake the operating lever for play. If too close, adjust the pin held in position by the the nut *8* to give a slight clearance.

The tension of the brake spring *5* should be just strong enough to hold the the slide from chattering.

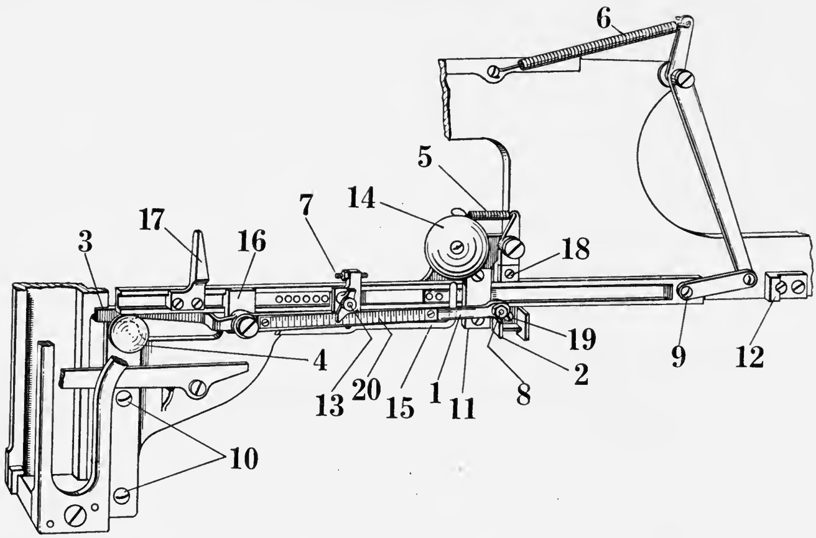


FIG. 28.—The First Style Assembler Slide rests within a recess provided in a supporting cast iron bracket, which is fastened to the face plate by dowels and the two screws *10* and *10*. The slide is confined within the recess by right and left gibs, *11* and *16*, which permit it to be moved freely lengthwise.

As matrices pass the assembler star and come to rest in an upright position in the assembling elevator, they move the slide to the left by the action of the assembler star causing them to bear against the finger *17*. As the matrices are assembled, the slide moves against the tension exerted by the spring *5* holding the fibre brake blocks *18* and *19* of the brake in engagement with the slide. Each matrix entering the assembling elevator is permitted to move the slide the thickness of its body.

When the assembling elevator is raised to lift the line to the delivery slide, it engages the end of the assembler slide operating lever *1* at *3* which causes the operating pin *8* extending backwardly from the lever to engage a thumb piece *2* on the slide brake. The action of the brake being moved by the operating lever *1* releases pressure of the brake blocks *18* and *19* from the slide, and the spring *6* retracts the slide to the right against the stop *12*.

There is a sliding block mounted in the slide groove, containing an adjusting knob *13* for the purpose of setting the assembler slide to any measure from 4 to 30 ems. The knob *13* is mounted upon a pin which extends through the block and the other end of this pin registers with one of a series of holes drilled in the assembler slide. Each one of these holes corresponds to an em division of the scale *20* upon the slide operating lever. Retracting the knob *13* disengages the pin from the hole, and the block may be moved along to another setting. A coil spring within the block under the knob *13* causes the pin to enter the hole of the em measure wanted. Turning the knob half way enables the assembler slide settings to be made on half-em measures.

A pawl (not shown) on the adjusting block, engages an extension on the left side of the bell hammer *15*, which strikes the bell *14*, warning the operator that the matrix line is nearly full.

The screw 7 on the adjusting block is for the purpose of limiting the distance between the assembler star and the finger *17* so the space will be a little less (about .014″) than the space between the vise jaws.

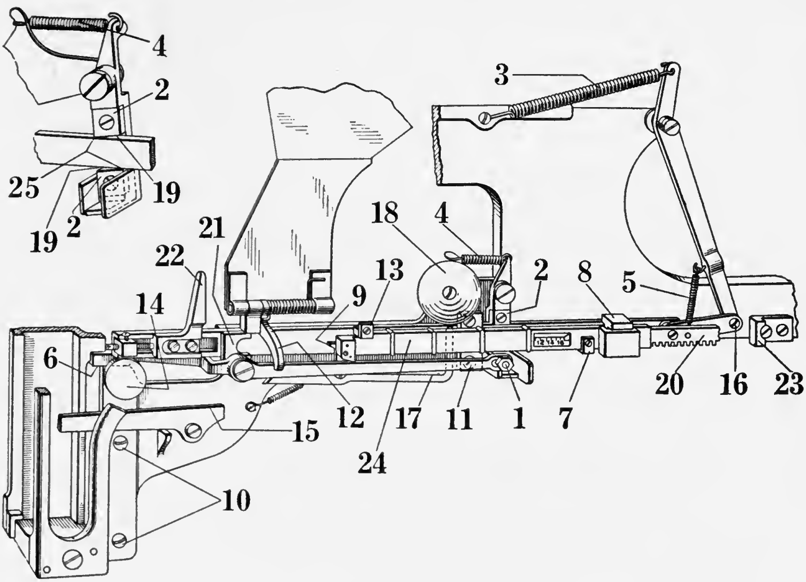


FIG. 29.—New Style Assembler Slide assembly. This slide is an improved pattern of the one shown in Fig. 27. Matrices, as they enter the assembling elevator, move the slide to the left by crowding against the finger *22*. As each matrix settles down, the slide is permitted to move under stress of the spring *4* holding the two fibre brake blocks *2* and *2* against the slide (shown in the detail drawing).

A small red indicator *13* approaches the releasing lever *12* as the line is being filled out so the operator can see how nearly full the line is. When the indicator *13* is within approximately three ems of banking against the lever *12,* a pawl *9* engages a projection on the bell hammer *17* and strikes the bell *18,* informing the operator that the matrices have nearly filled out the assembler measure.

After the matrix line is completed and the assembling elevator is raised so the delivery slide can convey the matrix line to the first elevator, a projection at the lower right side of the assembling elevator raises the end of the assembler slide brake operating lever *11* at *6*. This causes a pin *1* at the rear of the nut to engage the beveled edge of the thumb piece at the lower end of the brake so the fibre brake blocks *2* and *2* will be released from the slide. At this time the slide return spring *3* connected to the slide by a lever and link at *16* returns the slide to normal position against the stop *23*.

As the assembling elevator is lowered after having raised the matrix line to the delivery slide, it banks upon the end of the slide brake operating lever at *6,* raising the pin in the lever *11* from the brake, and the blocks *2* and *2* again grip the slide through tension of the brake spring *4*.

Fastened to studs upon the front of the slide is a rack *20,* having teeth at the under side spaced one-half em apart. Upon the rack *20* rests an adjusting block *24*. At the right side of the adjusting block *24* there is a detent *8* having several teeth at its lower end corresponding to the teeth in the rack *20*. A spring under the detent *8* holds its teeth in engagement with the rack teeth. The assembler slide measure may be changed by depressing the detent *8* and sliding the adjusting block *24* until the measure desired is indicated by the

pointer in the little window in the block, through which the scale is visible.

The lever *12* can be lifted out of engagement with the indicator *13* when the operator has overset the matrix line, so the excess matrix or two can be removed easily. Lifting the lever *12* releases the stress of the assembler star and permits the slide to move a short distance to the left.

This lever 12 is not intended to release the slide for the purpose of crowding in a hyphen or other matrix when the assembler has already been filled.

The inset detail drawing of the brake shows how the fibre brake blocks *2* and *2* grip the assembler slide. After long use the blocks may be reversed to provide new working faces. The corners *19* and *19* should be rounded to provide clearance, and freedom from binding.

New Style Assembler Slide

The assembler slide, Fig. 29, has a bar similar in shape to the first style bar. In place of the dovetailed adjusting block working in a groove in the bar, a block of new design, having a little window through which the em scale is visible, is mounted on the slide. The setting of the assembler is made by depressing the detent *8*, Fig. 29, and moving the block or cover to the measure wanted.

Function of the Tight Line Release.—There is a small lever *12*, known as a tight line release, which is intended to be raised by the operator when he has overset a line, so as to release the last matrix which binds the assembler star and would otherwise be difficult to lift out. It is not intended, however, that this lever be used for the purpose of crowding another matrix into the line which is already full.

If crowded lines are sent in to be cast, matrices will surely be damaged. When this lever is used properly as explained above, it is a great convenience to the operator.

The end of the block has a small red plate *13* which banks against the tight line release lever *12* and limits movement of the slide to the left. The position of this red plate in relation to the tight line release lever can be noted by the operator to see how full the line is as he is operating.

The slide travels on rollers, mounted underneath in the bracket. The roll *14* at the left side is of the same size as on the first style slide. At *11* under the right-hand gib, are mounted two small rolls which provide bearing for the right side of the slide. The small spring *5* offsets the weight of the slide adjusting block or cover. The keeper *7* helps hold the adjusting block in place on the rack *20*.

As the assembling elevator is raised, the slide automatically returns to normal position. The elevator raises the operating lever at *6*; the other end of the lever *11* containing an operating pin held in place by the nut at *1*, engages the brake thumb piece, releasing the upper and lower brake blocks from the slide. The upper block is shown at *2*, and the spring *3* returns the slide to normal position against its stop *23* on the face plate.

The leverage exerted by the operating lever pin upon the brake thumb piece can be regulated by the pin held in the slot in the end of the lever at *1*, which works against the lower end of the brake. Raise the assembling eleva-

tor, shake the operating lever slightly and when there is a small amount of play between the pin and the brake thumb piece the adjustment can be considered correct. If the pin is set too close the brake cannot hold the slide steadily while matrices are being assembled; if too far away it will not release the brake and the slide will not return to normal position, when the assembling elevator is raised to the delivery slide.

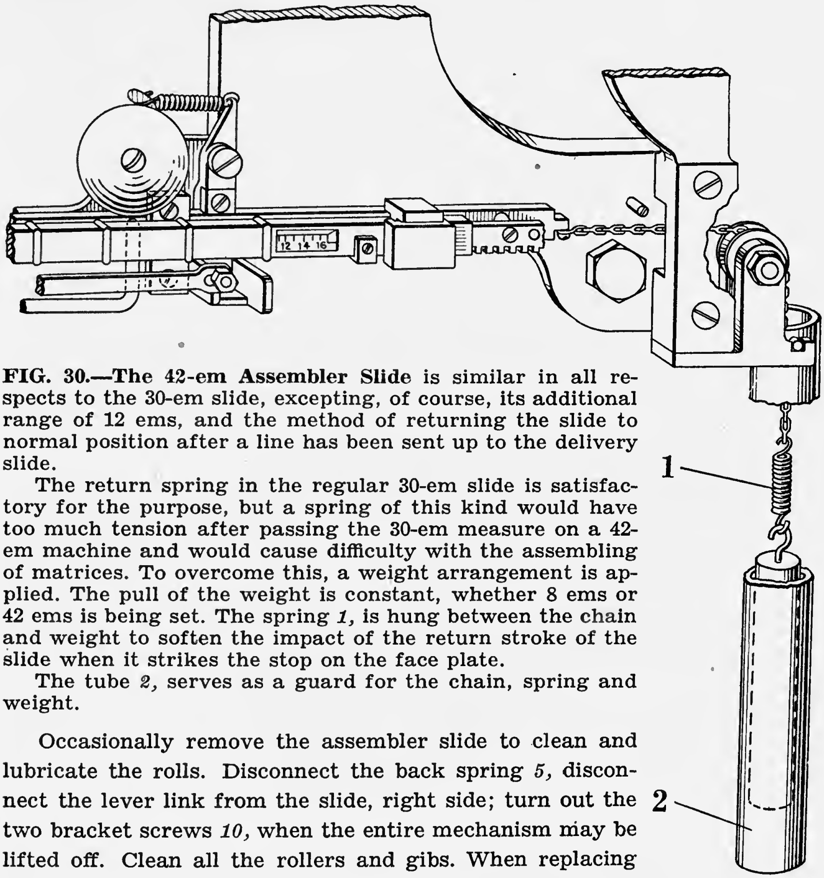


FIG. 30.—The 42-em Assembler Slide is similar in all respects to the 30-em slide, excepting, of course, its additional range of 12 ems, and the method of returning the slide to normal position after a line has been sent up to the delivery slide.

The return spring in the regular 30-em slide is satisfactory for the purpose, but a spring of this kind would have too much tension after passing the 30-em measure on a 42-em machine and would cause difficulty with the assembling of matrices. To overcome this, a weight arrangement is applied. The pull of the weight is constant, whether 8 ems or 42 ems is being set. The spring *1,* is hung between the chain and weight to soften the impact of the return stroke of the slide when it strikes the stop on the face plate.

The tube *2,* serves as a guard for the chain, spring and weight.

Occasionally remove the assembler slide to clean and lubricate the rolls. Disconnect the back spring *5,* disconnect the lever link from the slide, right side; turn out the two bracket screws *10,* when the entire mechanism may be lifted off. Clean all the rollers and gibs. When replacing the rollers use clock oil on the bearings.

Keep the slide clean and polish with a little dry graphite. *Never use oil to lubricate the assembler slide.*

Once in a while apply a little graphite grease to the bell hammer hub pawl *9;* this will prevent sticking the slide when the pawl engages the bell hammer, which might be a cause of transpositions.

The spring *4* supplies tension for the brake which holds the slide steady. It should have just enough stress to prevent chattering of the slide. The fibre

brake blocks when worn down after long use, can be reversed to furnish new gripping edges. In renewing or reversing the fibre brake blocks, the corner opposite the corner which grips the assembler slide should be rounded, otherwise it will bind against the slide and retard its return to normal position.

Assembler Slide Bell

A small bell mounted above the assembler slide warns the operator that the line is nearly full (within three ems) so that a syllable division may be made or proper spaces from the magazine put between the words, in addition to the spacebands.

Setting the Assembler

After applying a new star wheel, always reset the assembler so that a full line of matrices having one spaceband in the line will permit the star wheel to just turn over with difficulty. This means that when the line enters between the vise jaws before the cast, that no matrix lugs will be cut or mashed by the mold. During justification (with the assembler slide adjusting screw properly set) the top of the spaceband will be driven up even with the top of the first-elevator jaws in a line containing one spaceband.

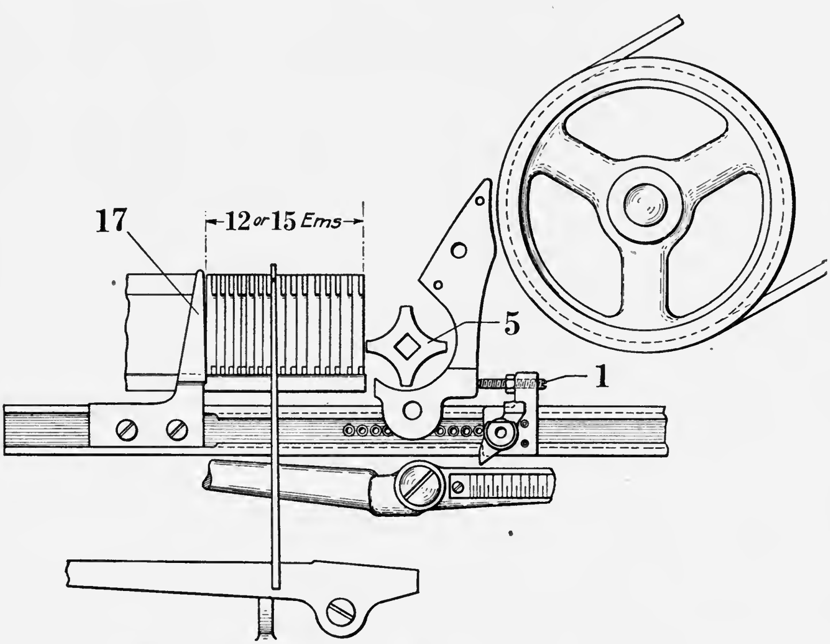


FIG. 31.—First Style Assembler Slide. Means of adjusting the em measure by the screw *1,* so the space between the assembler star *5* and the slide finger *17* will be approximately .014″ less than the space between the vise jaws.

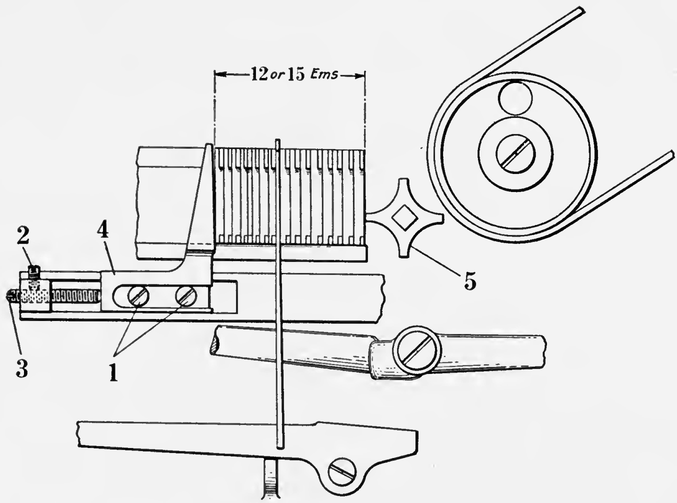


FIG. 32.—New Style Assembler Slide. Means of adjusting the em measure by the screw *3*, so the space between the assembler star *5* and the slide finger *4* will be approximately .014″ narrower than the space between the vise jaws. Screws *1* and *1* hold the finger *4* in the slide groove; the binding screw *2* holds the setting of the adjusting screw *3*.

It is natural to presume that the assembler measure should be set approximately .014″ less than the vise jaw measure, so that with one spaceband in the line the expansive power of the spaceband will permit the machine to make a cast. A thick spaceband (regularly used in most machines) has an expanding power of more than three points.

After the assembler has been set, do not send in any lines which stop the assembler star. This will be the best insurance against damaged matrices.

Setting the First Style Assembler Slide.—Set the assembler to any measure between 12 and 15 ems. Most newspapers use 12-em column measurement, and work in commercial shops will range around the 15-em length. On the first style assembler, shown in Fig. 31, assemble a line of matrices containing one spaceband. Fill out the line until the star wheel *5* "rattles." Send the line in, and during justification the top of the spaceband should be driven up about even with the top of the first-elevator jaws. Adjust the screw *1* until this result is obtained.

Setting the New Style Assembler Slide.—Follow instructions for setting the first style assembler slide above, except for the means of adjustment, which are as follows: Loosen the screws *1* and *1*, Fig. 32, holding finger *4* to the slide; loosen the jam screw *2* and adjust the screw *3* against which the finger *4* banks.

Chapter X

THE ASSEMBLING ELEVATOR

The assembling elevator receives the matrices and spacebands as they enter from the assembler, and affords a means of holding the matrix line, making it possible to see what has been set. The matrix line is visible to the operator through the opening in the gate, and any errors in composition may be corrected before lifting the line to the delivery slide. Hand spacing may also be performed in case it becomes necessary.

Hand Spacing refers to that process whereby the operator inserts thin spaces by hand between the words in the assembler in addition to the spacebands, so that before the cast is made, the spacebands will obstruct the full upstroke of the justification bar and expand the matrix line tightly between the vise jaws. In correct composition, sometimes it is necessary to thin space all the words in a line because the spacebands contained in the line would not have sufficient expansive power to justify the matrix line tightly. For this purpose, in addition to the brass hair spaces, three thicknesses of steel hair spaces (.003½″, .007″ and .014″) are carried in stock. Brass hair spaces range in thickness from .012″ to .022″. The thinnest regular thin spaces included with fonts and which run in the magazine are .0277″.

The assembling elevator is connected to and forms a part of the machine commonly spoken of as the assembler. The magazine holds matrices in storage and the assembling elevator is a temporary repository for the matrices after being released from the magazine. The assembler entrance, assembler chute and the assembler slide constitute a means of getting matrices into the assembling elevator after they leave the magazine.

In the foregoing pages an attempt is made to show how these various parts function to insure the correct mechanical assemblage of matrices and spacebands, and causes for various abnormal actions of matrices when they do not assemble as they should.

After the line is assembled, the assembling elevator is raised by means of a lever to the delivery slide which takes the line over to the casting apparatus.

The weight of the assembling elevator is counterbalanced by a spring, *1*, Fig. 33, at the left of the keyboard. This spring is adjustable for more or less tension by turning the screw hook to which it is attached. When once set, the adjustment will last indefinitely.

Assembling Elevator Lubrication.—The elevator is guided by gibs or slideways. Use dry graphite for lubrication here, as the application of oil is liable to be transferred to matrices. The gate roller under the spring *3* should receive one small drop of oil occasionally.

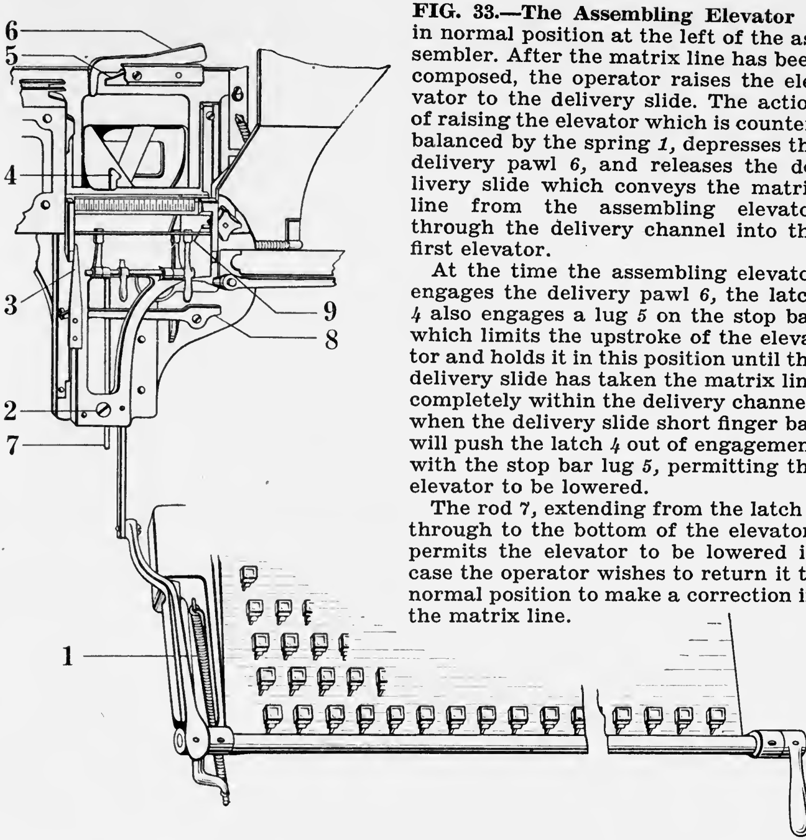


FIG. 33.—The Assembling Elevator is in normal position at the left of the assembler. After the matrix line has been composed, the operator raises the elevator to the delivery slide. The action of raising the elevator which is counterbalanced by the spring *1*, depresses the delivery pawl *6*, and releases the delivery slide which conveys the matrix line from the assembling elevator through the delivery channel into the first elevator.

At the time the assembling elevator engages the delivery pawl *6*, the latch *4* also engages a lug *5* on the stop bar which limits the upstroke of the elevator and holds it in this position until the delivery slide has taken the matrix line completely within the delivery channel, when the delivery slide short finger bar will push the latch *4* out of engagement with the stop bar lug *5*, permitting the elevator to be lowered.

The rod *7*, extending from the latch *4* through to the bottom of the elevator, permits the elevator to be lowered in case the operator wishes to return it to normal position to make a correction in the matrix line.

When the assembling elevator is raised to its extreme upstroke, the latch *4* engages a lug on the stop bar *5* which supports the elevator until the short finger bar releases the latch after the delivery slide has carried the last matrix into the delivery channel. After the machine has been in use a long time, it may be necessary to bend the stop bar lug *5*, Fig. 33, slightly upward so the assembling elevator, when raised to the delivery slide, will have support by engagement of the latch *4* with the lug *5*.

The delivery slide releasing lever *6* needs no attention except the occasional application of a little grease on the end where it engages the delivery slide short finger. This will insure an easy trip-off when a line is sent in.

There is a small pin *9*, Fig. 33, mounted in the right leg of the gate just above the duplex rail cap, the purpose of which is to deflect matrices downward from the cap into proper place on the assembling rail. Matrices will not often "ride the rail," but this pin will deflect the occasional one that does jump up on it.

It is possible, with rough treatment, to spring either the front casting or the gate. In the event the gate appears to be too far away from the back plate, first see that the distance from the back to front castings is correct. Place a new pi matrix with unworn lugs on the rails; there should be freedom, but not too much. After the castings are brought into line, test the gate. If the screw *2* which holds the front and back plates together, is not properly tightened, the space between the top rails will be too wide.

Handle the gate with reasonable care. If it should be sprung at any time, do not bend the legs in order to bring it into line again, but rather twist the center of the top part of the gate in a bench vise while it is removed from the elevator, first taking off the em scale. Attempting to bend or twist the gate legs will surely break them off.

The gate hinge pin *8*, Fig. 35, should at all times be kept screwed up tightly. In case it works loose, the gate will have lost motion.

Function of the Duplex Rail.—It has been previously explained that most matrices, from 5 point, up to and including 14 point, have two characters punched in their casting edges. This enables the user to cast two faces from the same set of matrices.

The delivery channel, first-elevator jaws and the mold are provided with two levels of rails upon which matrices may rest. The assembling elevator also has two levels for the assembling of matrices. When assembled on the lower rail they may be said to be in normal position. If they are sent through the machine on the upper or duplex rail they are said to be in auxiliary or high alignment position.

One of the two faces to be cast is assembled in the elevator on either the upper or lower rail, as it is expressed, in order to present the matrices to the mold in the proper position according to the face desired, or they may be assembled partly on both levels where it is desired to have accentuated words for display purposes, or in other cases, certain words emphasized in italics or bold face with roman reading matter. The duplex rails are frictionally held in position between the top surface of the front plate casting and cap by a bronze bow spring, each end of which rests upon one of the duplex rails. The spring is placed in a groove or pocket in the cap.

When the elevator has been raised and it is desired to lower it to assembling position again, in order to make a correction in the matrix line, release the latch *4* by pushing up on the rod *7* at the bottom of the elevator.

Assembling Elevator Maintenance

The gate pawls, *5* and *6*, Fig. 35, retain matrices after entering the elevator and prevent them from falling out as the elevator is being raised to the delivery slide. The pawls have small springs which keep them in place. The tension of these springs should be just strong enough to throw the pawl against its stop pin. If the spring tension is too strong matrices will either not be thrown past the pawls or transpositions may occur.

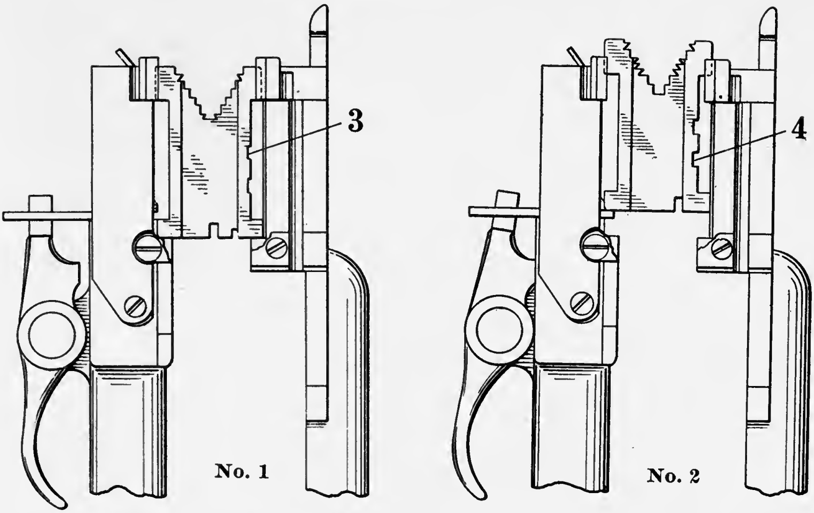


FIG. 34.—Detail End Diagrams of the Assembling Elevator showing how matrices are assembled in upper and lower positions in order to cast different faces of type from one of the two matrix cells.

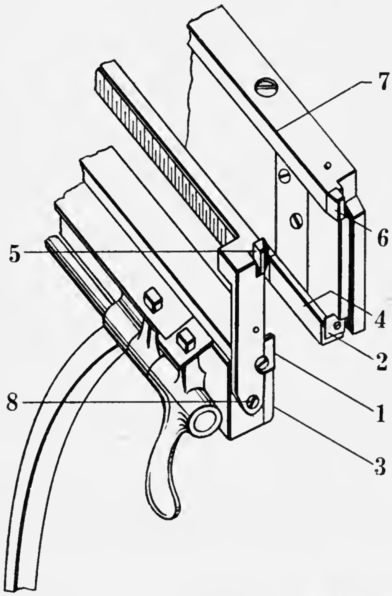
In No. 1 the matrix rests on the lower or normal rails, and on this level the matrix is usually punched to cast from the roman letter alignment characters, indicated at *3*. The duplex rail is not used.

In No. 2 the assembling elevator duplex rail is pushed in. Matrices are assembled upon this rail so the auxiliary matrix cell *4* will be presented in front of the mold to cast italic or bold face characters upon the slug. Small capitals are also cast from this position of the matrix.

The little detaining plates *1* and *2* fit snugly against the lower ends of the assembler chute rails. The space between the plates and the assembler chute rails should never be wide enough to permit thin matrices to catch between the two parts. In the first style assemblers the chute rails wear down at the place opposite the assembling elevator detaining plates and are a cause for assembling troubles. In some cases the chute rail can be piened or swelled out to original dimension again so that matrices will not be cuffed by the detaining plates. This is mentioned here because it has been found that a great many operators attempt to manipulate the detaining plates in the assembling elevator when the lower ends of the assembler chute rails need attention or replacement. The detaining plates are unfixable.

At the point *7*, spacebands will eventually round off the top of the back plate rail to such an extent that they will fall down when the gate is opened for corrections. Replacement is the only remedy. The same may be said of the spaceband buffer finger *8*, Fig. 33. After a long time a depression will be worn in the top of the finger by the spacebands. Above this point in the assembling elevator there will be no support for the spacebands when the elevator gate is opened.

Replacing the Buffers.—If the front rail buffer *3,* Fig. 35, is worn very much, matrices entering the assembling elevator will have impact only with the back rail buffer *4,* and cause undue wear on the lower back matrix lug. The steel buffer *4* is also renewable, but wears down only at long intervals. When applying a new one, it may be necessary to draw the temper of the lower buffer rail and dress it by filing until it matches the elevator back plate casting recess in which it rests. Afterwards harden the lower buffer rail by heating to a red color and dip only the rail or buffer in water, as this is the only point of wear.



The front buffer *3,* has been made both of fibre and steel. If the elevator is fitted with the fibre type, renew it frequently. In order to replace the front buffer, turn out the screw *2,* Fig. 33, in the lower part of the assembling elevator front plate, and gently work the plate from the dowels so as not to spring the front plate.

FIG. 35.—Section of the Assembling Elevator, shown in perspective end view, which, with the accompanying text, explains the functions and maintenance of the parts indicated. The parts indicated are subjected to severe usage and are designed to resist wear.

Removing the Assembling Elevator

To remove the assembling elevator for the purpose of fitting in a new steel back rail matrix buffer, open the vise to first position, disconnect the lever link at the bottom of the elevator; take out the left-hand gib screws, loosen the two screws holding the delivery channel in place and pull the channel out slightly from the face plate; remove the left-hand gib; raise the spaceband buffer finger to a nearly vertical position, take the elevator out by turning it slightly and moving the left side out first.

Forty-Two-Em Assembling Elevator

The 42-em assembling elevator, except for its increased capacity, is similar in all respects to the 30-em assembling elevator. The care and adjustment of it is the same.

Chapter XI

THE DELIVERY SLIDE

We pass now from the assembling part of the Intertype to the casting mechanism. As stated in the first part of the book, the Intertype is really three mechanisms in one—an *assembling* mechanism, a *casting* mechanism, and a *distributing* mechanism. Each one of these three mechanisms is a machine in itself, but are linked together in order to complete the process of assembling the matrix line, casting a slug or type bar, and distributing the matrices into the magazine.

The all-important link between the assembling and casting mechanisms is the delivery slide. This slide is a means of automatically transferring the matrix line from the assembling elevator to the first-elevator jaws, which receive and convey it to the mold.

The delivery slide rests normally just above the assembling elevator, and may be said to be a slide within a slide. A long finger slide is connected to the short finger slide by an adjustable rod with notches cut in its upper surface, one em apart. The slide operates in a slideway or track in the face plate. Its motion to the left is actuated by a large spring within the machine column, suitably retarded or controlled by an air cylinder at the rear of the column. After the slide has delivered a line of matrices to the first elevator it also automatically starts the casting section of the machine in motion, and a cam returns the delivery slide to normal position, ready to deliver another line to the first elevator jaws.

Detailed action of the delivery slide is described under Fig. 37, page 78.

A waiting line is one that is sent over before the previous line has been transferred to the second elevator. The cam is so shaped that the slide remains stationary within the delivery channel until the machine is about at normal position when the slide automatically moves over to the first elevator.

The principal adjustments of the delivery slide are in the cam roller arm *15* at the back of the machine column, and the screw *2* in the face plate. The delivery slide is adjustable for return stroke by moving the cam roller arm.

In case the delivery slide does not have enough overmotion stroke to come past the delivery pawl about 1/16″, additional leverage will be needed.

It is well to go over the screws in the various parts of the slide to see that they are turned up tight before making any adjustment.

Delivery Slide Return Stroke Adjustment.—In order to make adjustment of the delivery slide lever cam roller arm *15,* Fig. 37, so the slide will have 1/16″ overmotion on its return stroke in relation to the fixed position of the delivery pawl, proceed as follows: Disconnect the pot pump plunger rod pin, and have the delivery slide resting in normal position above the assembling

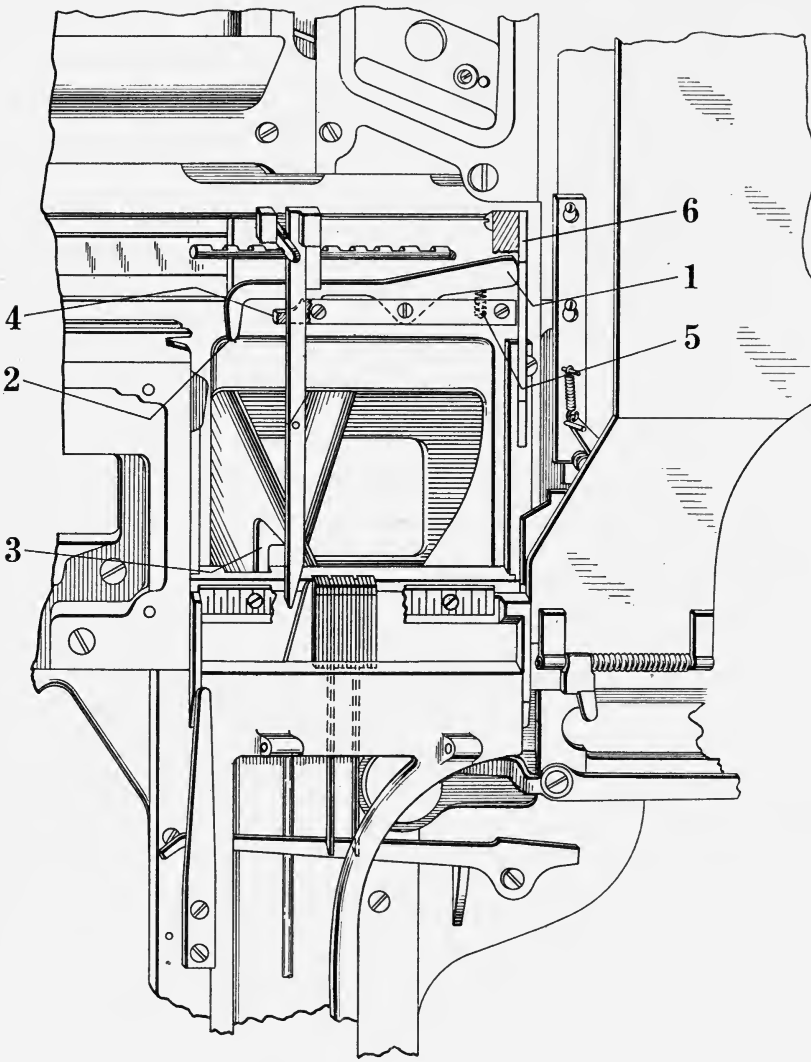


FIG. 36.—The Delivery Slide is held in normal position by the delivery pawl *1*, ready to receive a line of matrices from the assembling elevator. The elevator, when raised, trips the pawl *1* by engaging its lug *2*, which depresses the right side of the pawl from contact with the delivery slide short finger *6*, and permits the slide to start to the left, taking with it the matrix line from the assembling elevator. This drawing also shows the means of support for the assembling elevator when a line is raised and before the delivery slide has taken it into the delivery channel. The latch *3* engages the stop bar lug *4*, and the latch *3* is released by the slide short finger bar after the matrix line has been conveyed into the delivery channel.

elevator. Run the machine ahead until the high point or crown *20* of the delivery cam *21* is directly opposite the arm cam roller *3;* loosen the cam roller arm screws *1* and *1,* and push the cam roller arm *15* so the roller *3* will touch the cam crown *20,* and tighten the screws; now back the machine with the friction clutch arm by hand until there is about 1/16″ space between the delivery lever arm roller *3* and the delivery cam *21,* just in front of the cam crown *20;* loosen the screws *1* and *1* again and move the cam roller arm so the roller will touch the cam; the arm screws can now be brought up tight.

The first time the novice may be called upon to adjust the delivery slide return or overmotion stroke, a better understanding will be obtained if the actual working of the delivery pawl *1,* Fig. 36, and the slide can be seen. Fasten the spaceband transfer lever pawl with cord, so the pawl will be held up, then remove the spaceband box. Proceed with the adjustment as given above. In this way the one making the adjustment can look down at the point where the pawl engages the slide and see how the overmotion stroke is made.

In this operation the metal pot mouthpiece will be locked against the mold part of the time while the delivery slide lever arm roller is in contact with the high point or crown *20* of the delivery cam. *Do not let the machine stand in this position any longer than necessary, as the heat from the pot mouthpiece might draw the temper in the mold.*

If the arm *15* on the shaft *7* is set so as to cause too much overmotion stroke, the slide will be forced against the spaceband box chute to such an extent as to move the lower end of the chute. There should be no movement of the chute when the delivery slide is at its extreme right stroke. If the cam roller arm *15* is adjusted so that the slide returns too far to the right, in all probability the slide will not be positioned far enough in the delivery channel on a waiting line and the end matrices will squabble or twist.

Delivery Slide Casting Stroke Adjustment.—The stroke to the left (or casting stroke) is regulated by the screw *2,* Fig. 37, in the face plate. Set the screw so that the right side of the short finger is 13/32″ from the right side of the first-elevator jaws shown in the detail drawing, Fig. 37. Should the adjustment be made so that the slide does not enter the first-elevator jaws the full distance, the end matrix (right side) will rub the vise jaw in the region of the matrix cell, and in some cases cause hair lines by breaking down the thin side wall of each matrix contacting with the jaw.

Delivery Slide Stopping Pawl Plate Adjustment.—After the above adjustments have been made, set the plate on the stopping pawl *18* in the delivery cam *21* so that when the delivery slide is sent over, the roller *3* will push the pawl 1/64″ clear of the upper stopping lever *19* in the vertical lever bracket.

In regard to this adjustment, it is taken for granted that the stopping pawl is located 15/16″ from the edge of the cam, the stopping pawl rests

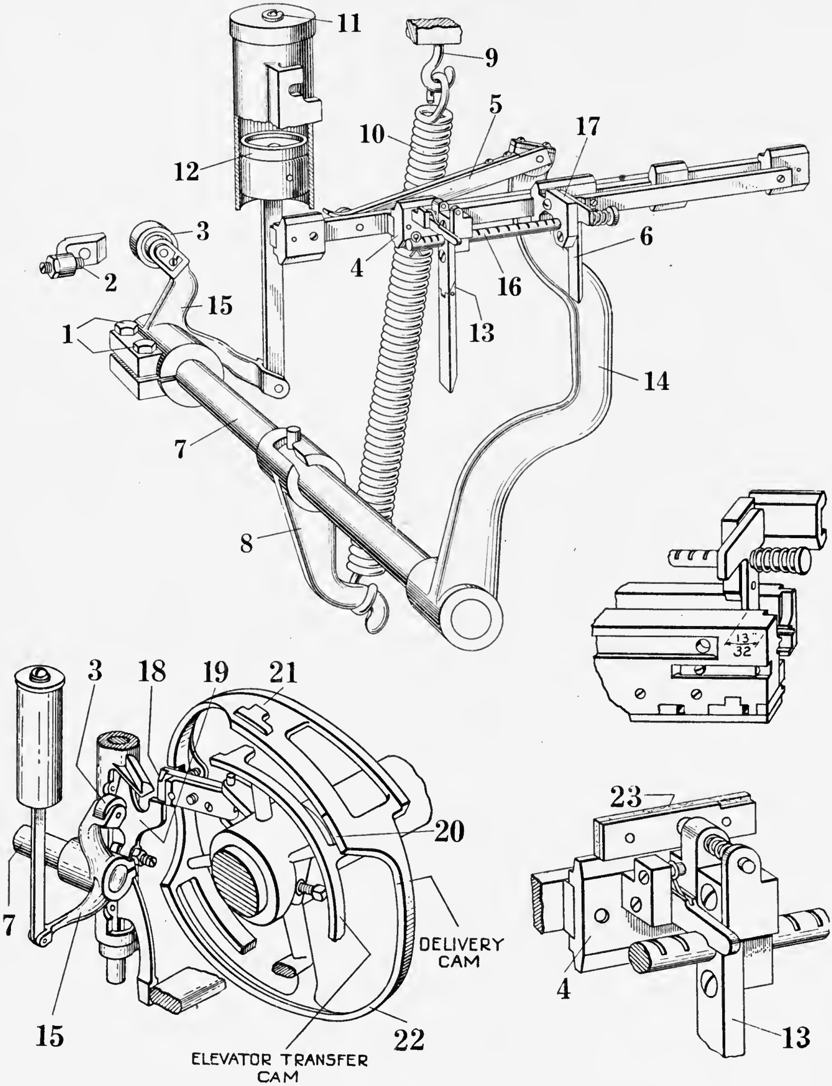


FIG. 37.—Perspective Drawing of the Delivery Slide, the delivery lever *14,* and the air cushion cylinder arrangement. The supporting bearings have all been stripped away to show how the parts are connected. The shaft 7 passes through the machine column from the front to the rear. The lever *14,* fastened to the shaft 7, is connected to the delivery slide by a link *5.* At the rear of the lever shaft 7 is fastened an adjustable arm *15,* having a split hub which grips the shaft and is held tightly by the screws *1* and *1.*

When the delivery slide is released by the action of raising the assembling elevator, the delivery pawl *1,* Fig. 36, is thrown down and out of engagement

with the short finger *6*. The delivery slide through the spring *10*, Fig. 37, connected to the shaft 7 by the spring arm *8*, starts rapidly on a horizontal line in the face plate slide track, toward the left, to convey the matrix line from the assembling elevator, through the delivery channel into the first-elevator jaws. Upon reaching the delivery channel the speed of the slide is cushioned by the piston *12* compressing the air in the cylinder. The speed of the slide is brought under control but is not entirely shut off, since the adjustable vent *11* at the top of the cylinder permits enough air to escape to cause the slide to continue at a slower speed to the first elevator, where it is stopped by the adjustable stop screw *2*.

At the same instant the slide is stopped in its stroke to the left by the stop screw *2* in the face plate, the arm roll *3* engages the plate on the automatic stopping pawl *18*, pivoted in the delivery cam *21* and pushes it from the upper stopping lever *19*, which permits the clutch to go into action, starting the machine. The first elevator descends to the vise, taking with it the matrix line from between the long finger *13* upon the block *4* and the short finger *6* fastened to the block *17*. The delivery slide remains in a stationary position until the first elevator has gone fully down to the vise cap with the matrix line. The revolving delivery cam *21* then engages the cam roller *3* upon the cam roller arm *15*, returning the slide to normal position. When the delivery cam *21* has revolved far enough to cause the cam crown *20* to be in engagement with the delivery lever arm roller *3*, the delivery slide short finger *6* will be overthrown 1/16″ beyond the end of the delivery pawl *1*, Fig. 36. The pawl by action of the spring *5*, Fig. 36, holds the slide at normal position until it is again depressed by the action of raising another matrix line by the assembling elevator.

A waiting line is one that the operator has sent in before the machine has made one revolution. The line waits in the delivery channel; as soon as the machine has finished one revolution, the shape of the cam *21*, Fig. 37, is such that the spring *10* will cause the cam roller *3* to follow it and the waiting line will be automatically delivered to the first elevator. While the line is waiting, it is held within the delivery channel by the delivery lever arm cam roller *3* resting against the shallow surface *22* of the delivery cam *21*.

upon or overlaps the upper stopping lever ¼″, and that when the delivery slide has made its extreme stroke to the left, that the short finger is 13/32″ inside the first-elevator jaws. The above three adjustments checking all right, the plate on the stopping pawl may be set so that when the delivery slide is resting against the stop screw in the face plate at the left of the machine, the roller will push the stopping pawl 1/64″ clear of the upper stopping lever.

Delivery Slide Link.—The slide is connected to the front lever *14*, Fig. 37, by a link *5*, on the top of which is mounted a safety tongue spring. In case of an accidental interference with the return stroke of the slide, such as raising a line in the assembling elevator before the slide has returned to normal, the link will be disconnected from the lever. It is easily slipped into the bearing again by placing the end of the link against the screw stud in the delivery slide bar and compressing the parts.

From the above description of the delivery slide cam roller arm and lever link, it will be seen that the parts are amply protected against breakage in case of an accidental interference with the return stroke of the slide.

The tension of the lever spring *10* can be regulated by turning the hook *9*. The spring is connected to the shaft by the spring arm *8*. When once set, this adjustment will last indefinitely.

As a safety feature, the long finger *13,* is split or hinged. Between the joint is located a small spring and detent to keep the parts in line. Should the operator's finger get caught, or a spaceband lodge in the delivery channel, the hinge will give and prevent any injury.

On the first style delivery slides a small spring is placed at the right of the adjusting rod *16* to take up lost motion in the connection between the two fingers. Occasionally, this spring will break and interfere with the return stroke of the slide to such an extent that the delivery pawl cannot engage the short finger. The spring should then be replaced. A broken adjusting rod spring will also permit the end matrices in a loose line to turn at an angle and cause a front squirt.

Delivery Slide Friction Shoe.—On the later machines, above the long finger *13,* and forming a part of the block *4,* is mounted a leather-lined friction shoe *23,* and spring. The shoe bears against the front of the upper track in the face plate. Its purpose is to hold the long finger in a stationary position until the delivery slide has advanced far enough to close in any open space that may be present between the long finger and the matrix line. In other words, if an operator is setting a 17-em measure and a 16-em line is sent over, the shoe *23* will not permit the long finger *13* to move until the delivery slide has advanced the matrix line against the finger. This prevents end matrices falling out of the line or squabbling, which might result in a front squirt. When changing measures, the operator should always set the long finger with the lower end close to the assembler slide finger.

Delivery Slide Speed Regulation.—The delivery slide makes its casting stroke under control. This is accomplished with an air cylinder fastened at the rear of the machine column and a piston *12* connected to the lever.

It should be understood that the delivery slide in making its casting stroke, starts rapidly, and as it enters the delivery channel, is slowed down or cushioned by the piston working in the cylinder under compression. An adjustable vent *11,* at the top of the cylinder regulates the speed of the stroke of the slide.

On a waiting line, the stroke of the slide should cushion softly as it enters the delivery channel. Screws will work loose on the slide parts if the speed is not properly regulated.

In case the delivery slide is not released when the assembling elevator engages the lug *2* of the delivery pawl *1,* Fig. 36, remove the pawl, place it in a bench vise and bend the lug down a trifle. This will give the assembling elevator more leverage against the pawl to release the delivery slide.

Delivery Slide Piston Packing Lubrication.—Occasionally, oil the leather piston packing *12,* Fig. 37, and the inner chamber of the cylinder. The leather should be soft and pliable. If not properly fitting against the cylinder wall, speed regulation cannot be obtained. The first style cylinder has a removable cap with a washer packing between the cap and top of the cylinder. It is an easy matter to oil the leather occasionally after removing the cap. The new

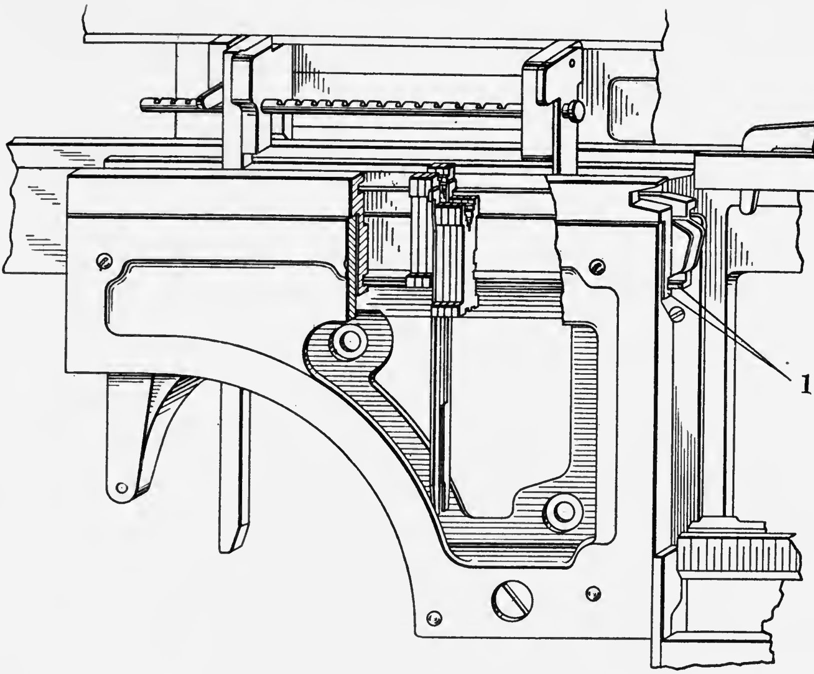


FIG. 38.—The Delivery Channel, which supports the matrix line while the delivery slide is conveying it to the first elevator. There are supporting rails for normal and auxiliary-positioned matrices and grooves for the spaceband sleeve lugs.

style cylinder can be oiled by sending the delivery slide over and applying the oil with a swab from the bottom of the cylinder.

If the vent hole *11* is closed too much, the slide will travel slowly from the delivery channel to the first-elevator jaws.

The leather piston head packing in time wears down and will need renewal. If air escapes from between the packing *12* and the cylinder wall, so that adjustment of the vent does not cause the delivery slide to enter the delivery channel with a cushion stroke, on a waiting line, it may be necessary to put one or two muslin washers under the packing ring so as to expand the leather against the cylinder wall, afterwards adjusting the vent *11* at the top of the cylinder.

Use dry graphite to lubricate the delivery slide track. If a mixture of oil and graphite is present in the slide, the combination will make a sticky mess, and the slide will travel sluggishly, let alone the danger of oil fouling the matrices. Clean the track with gasoline. An insect powder gun effectively puts the graphite where it is wanted.

The Delivery Channel

The ends of the delivery channel rails, right side, shown at *1,* Fig. 38, and the matrices will become burred if the assembling elevator is continually raised with considerable force. These burrs must be removed or they will injure other matrices. The delivery slide, for the same reason, should have its speed retarded sufficiently so that it will enter the channel properly.

It is possible to spring the front plate of the delivery channel towards the back plate, in case the first style upper first-elevator slide gib is not adjusted so that when closing the vise, the right side of the first-elevator jaw will not strike the left side of the delivery channel front plate. When the front plate is deflected inwardly the speed of the delivery slide will be retarded. The spacing from the inside of the front plate rail to the back plate rail will be right when there is approximately .005″ play between a new pi matrix and the plate rails. See pages 93 and 95 for adjustment of the gibs.

Chapter XII

FIRST ELEVATOR AND VISE AUTOMATIC

As mentioned previously, the line of matrices and spacebands is transferred from the assembling elevator by the delivery slide to the first-elevator jaws. The first elevator is a means of supporting the matrix line, presenting it to the mold for alignment of the letters during justification of the spacebands and holds the line in a justified position while the cast is being made, and afterwards lifts or elevates the matrix line, together with the spacebands, to a level with the transfer channel at the top of the face plate, where the matrices and spacebands are pushed into the transfer channel, in order that the matrices may be lifted by the second elevator which returns them to the distributor. The spacebands are returned to the spaceband box by the spaceband transfer lever pawl.

The first elevator consists of a long cast iron slide positioned vertically at the front and to the left of the machine. The slide is guided vertically by gibs, and its position is sustained by a cam through a lever pivoted on a shaft at the rear of the machine. The lever's connection with the driving cam is through an auxiliary lever carrying a small roller.

The first-elevator cam promotes all upward movement of the first elevator. All downward movement of the slide is effected by its own weight as depressions in the cam permit.

The first-elevator lever and slide are connected by a link, consisting of two eyebolts, a cylinder and a spring. The link is so arranged that when the elevator rises to make alignment of the matrices, the lever urges the elevator upwards through pressure of the spring in the link. The spring pressure is used again as the elevator comes to transfer position where the matrices and spacebands are moved into the transfer channel.

It will be noticed that there is a slight compression of the link and top eyebolt when the first elevator rises for matrix alignment, and also when the elevator is being seated at its top stroke opposite the transfer channel. This spring link between the lever and slide eliminates what is called "metallic shock" and provides flexible overmotion.

The first-elevator head, is composed of two jaws (front and back) separated by an oblong steel separating block at the left side, of a thickness to exactly permit entrance and egress of matrices. The right side of the jaw is open so that matrices may enter with the delivery slide or be transferred from the jaws by the finger in the transfer slide. Two screws passing through the three parts hold the jaws together. The jaws are held in position on the slide by a key and by two large screws passing through the front jaw into the slide.

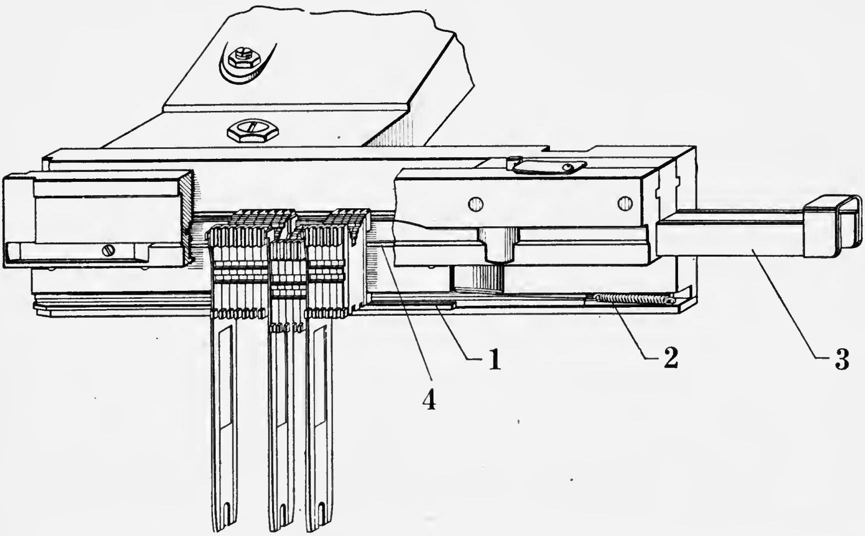


FIG. 39.—View of the First-Elevator Back Jaw broken away to show how matrices are held in the front jaw by means of the normal and auxiliary rails. The upper edge of the adjusting bar or normal rail *4,* supports the low matrices which will cast roman characters. The high alignment or duplex rail *1,* supports the raised matrices, which will cast italic or bold face characters.

The matrix line in this figure will be held in this position (two levels) until the first-elevator slide has risen to transfer position after the cast, where the duplex rail *1* will be retracted at an angle of 45 degrees from under the raised matrices, which will permit them to drop to a common level with the matrices that are in normal position; the line will then be transferred to the second elevator and returned to the distributor.

The small spring *2* returns the duplex rail to normal position again as the first elevator descends from transfer position. The line stop *3* is adjustable to the length of line being set and prevents the end matrices falling over during movements of the elevator.

First-Elevator Aligning Rails.—The jaws have rails which register with grooves or rails of the delivery channel. One of these rails receives matrices which are in normal position, as previously explained in reference to the two-letter matrix, and is fixed as to position. The back part of this rail in the front jaw is also called the adjusting bar, and is held in place in the front jaw by five screws. This bar supports matrices for facewise alignment—that is, all matrices bank against the bar so that all letters on the slug will be of even height. During normal or roman letter alignment, the top of this bar raises the matrices vertically, which makes all letters align at the bottom.

The Duplex Rail.—The other rail is called the duplex rail, and is movable. This rail supports matrices in auxiliary position in the first elevator and is used principally when casting italic or bold-face type. The object in having this duplex rail movable is to drop the matrix line from auxiliary to normal

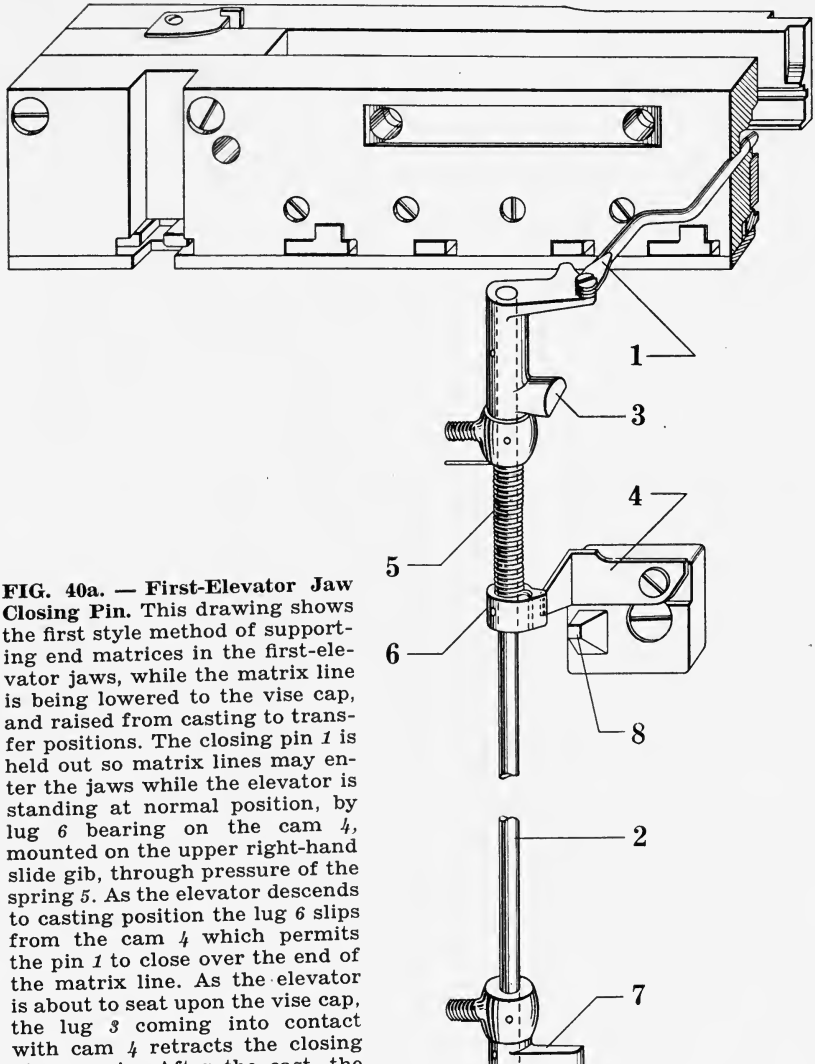
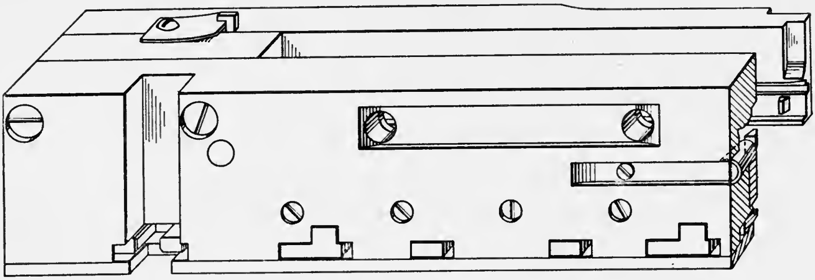


FIG. 40a. — First-Elevator Jaw Closing Pin. This drawing shows the first style method of supporting end matrices in the first-elevator jaws, while the matrix line is being lowered to the vise cap, and raised from casting to transfer positions. The closing pin *1* is held out so matrix lines may enter the jaws while the elevator is standing at normal position, by lug *6* bearing on the cam *4*, mounted on the upper right-hand slide gib, through pressure of the spring *5*. As the elevator descends to casting position the lug *6* slips from the cam *4* which permits the pin *1* to close over the end of the matrix line. As the elevator is about to seat upon the vise cap, the lug *3* coming into contact with cam *4* retracts the closing pin *1* again. After the cast, the elevator rises, and pin *1* closes through pressure of the spring *5*.

Upon reaching transfer position, lug 7 engages the gib projection *8*, which opens the closing pin again, so that matrices may be transferred to the second-elevator bar. As the elevator descends, the lug 7 is released from the projection *8* and the pin closes. At normal position of the first elevator, the lug *6* once more engages the cam *4* and opens the closing pin *1*. It is desirable to discard the first style closing pin device and have the first-elevator jaws reworked in order to apply the new style detents, which are shown in Fig. 40b.



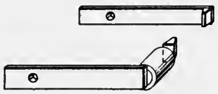


FIG. 40b.—New Style First-Elevator Jaw Detents. The small triangular detents are held in place by the flat springs. These hardened detents permit matrices to slide from the first-elevator jaws with a rolling spring resistance and effectively prevent end matrices tumbling from the jaws. The detents can be turned to present a new edge as they wear down.

position just before transfer to the second elevator takes place, or, in other words, all matrix lines are transfered from the first to the second elevator in normal position from the fixed rail in the front jaw of the first elevator.

The Spaceband Rail or Groove.—A third rail or groove is put in the jaws to support the spacebands which justify the lines. The sleeve or short slide of the spaceband has projecting ears which enter these grooves. The long wedge of the spaceband is movable vertically during justification of the matrix line, but the sleeve or short slide is fixed as to vertical position during justification and supports the spaceband in its travels from the assembling elevator until it is returned to the spaceband box. The spaceband rails or grooves also match similar grooves in the delivery and transfer channels.

In order to prevent matrices falling out endwise from the jaws while being conveyed from normal position to casting position in the vise, or from the vise (after casting) to transfer position, a small spring and detent arrangement is mounted in the front and back jaws at the right, Fig. 40b. A double bar slide or adjustable line stop prevents them tipping over at the left, *3*, Fig. 39. The position of matrices in the jaw at the right is always constant and at the left it varies, according to the length of line being set.

The first elevator starts its downstroke after receiving a line of matrices and spacebands from the delivery slide, the machine being set in motion by the action of the delivery lever arm roller pushing the stopping pawl from the upper stopping lever, which permits the clutch arm buffers to engage the driving pulley. At the instant the cams begin to revolve, the first elevator is permitted to go downward where it settles upon the vise cap. In doing this, it stops so that the lower back lugs or toes of the matrices register with one of the two grooves in the face of the advancing mold. The mold must advance

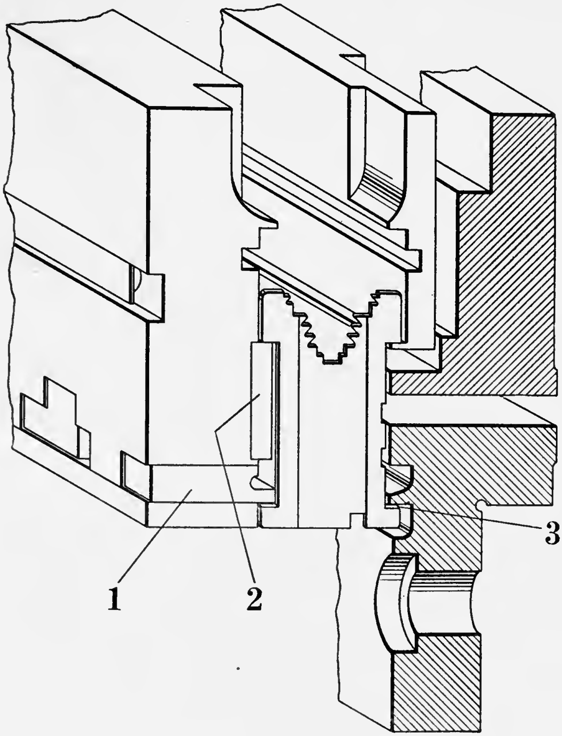


FIG. 41.—This view shows a matrix resting at normal or roman position in the first-elevator jaws. The duplex rail is indicated at *1; 2* is the adjusting bar. The lower back lug of each matrix has about .010″ clearance between its upper surface and the underside of the mold groove, at the point *3*. This clearance is necessary so the matrix lugs will not be sheared or mashed by the mold as it advances to the matrix line.

over the matrix toes without touching or damaging them, and with a little clearance between the upper edge of the matrix toes and the underside of the groove in the mold. This is provided for by regulating the distance the first elevator shall travel down to its position on the vise cap, with the adjusting screw in the top of the elevator slide. The elevator, in making its downstroke, is stopped when the screw rests upon the vise cap. The clearance between the tops of the lower back matrix lugs or toes and the underside of the aligning groove in the mold should be about .010″.

The Vise Automatic

In case the first-elevator slide does not make its full downstroke to the vise cap, due to an overset line or other obstruction, such as a stray matrix between the parts, the advancing mold is halted by a safety device called the

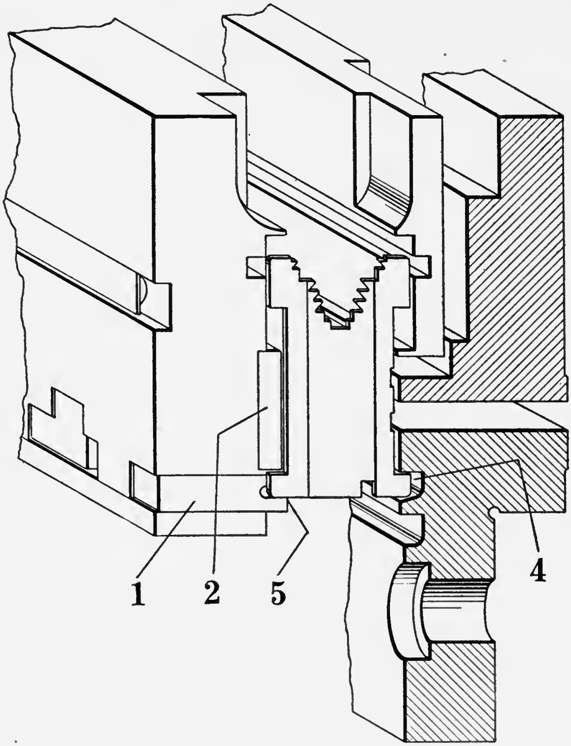


FIG. 42.—This view shows a matrix in high alignment or auxiliary position, locked against the mold. The lower back lug of each matrix enters the high alignment groove *4* in the mold. Notice that the matrix line is aligned by upward pressure of the duplex rail *1* against the lower front matrix lug at *5*. The adjusting bar *2* does not assist in vertical alignment while matrices are in position on the duplex rail *1*. The adjusting bar, however, takes the banking thrust of the reference or front side of the matrix through the pressure exerted by the mold from the metal pot mouthpiece.

vise automatic. If this mechanism were not present in the machine, the advancing mold would mash or cut the lower back toes of the matrices and make them unfit for further use in the machine, for the reason that to a large extent, letter alignment is dependent upon the good condition of both the lower front and back matrix lugs, and matrices so cut or damaged cannot slide into the magazine channels.

Function of the Vise Automatic.—Normally, the first elevator slide, banking by its screw on the vise cap, also pushes down by means of another screw, upon a vise automatic stop rod projecting through a hole in the vise cap, so that a pawl in the rod clears a plunger in the vise in front of the mold disk. The plunger, or dog, as it is called, is pushed forward by the mold disk.

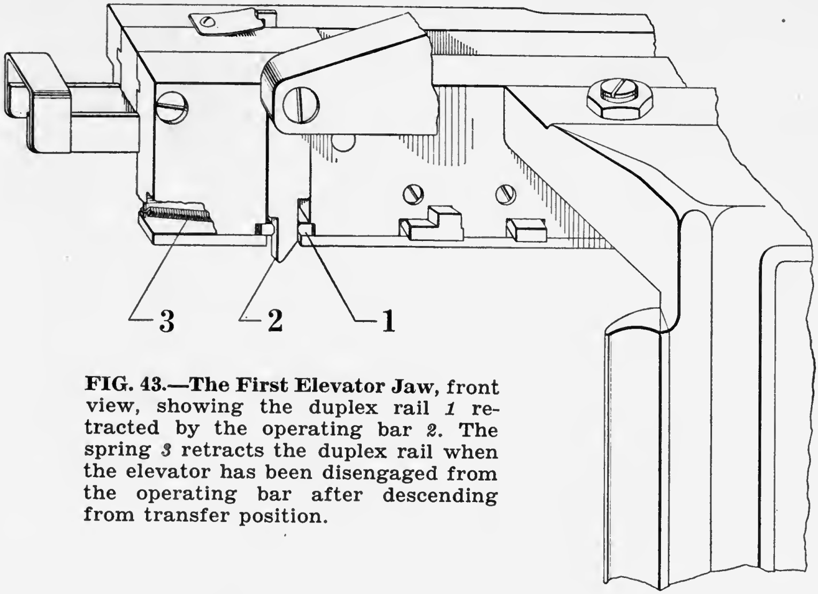


FIG. 43.—The First Elevator Jaw, front view, showing the duplex rail *1* retracted by the operating bar *2*. The spring *3* retracts the duplex rail when the elevator has been disengaged from the operating bar after descending from transfer position.

If, however, the first elevator does not descend its full distance, as in the case of an overset line, or other obstruction, the second screw in the top of the slide does not depress the vise automatic stop rod. This positions the pawl in the rod directly in front of the plunger in the vise frame which is being pushed forward by the mold disk. The plunger, striking the pawl in the automatic stop rod, operates the lower end of the rod against a lever in the vise frame. This lever, in turn bears against a bar in the starting and stopping lever bracket, opposite its other end. The bar runs through toward the rear of the machine, and its connection with other parts, disengages the driving clutch, stopping the machine, which cannot start again until the obstruction has been cleared away. Shut off the controlling lever, when the elevator can be raised from the vise by hand and one or two of the end matrices taken out, the first elevator seated once more, and the starting and stopping lever opened to set the machine in motion again.

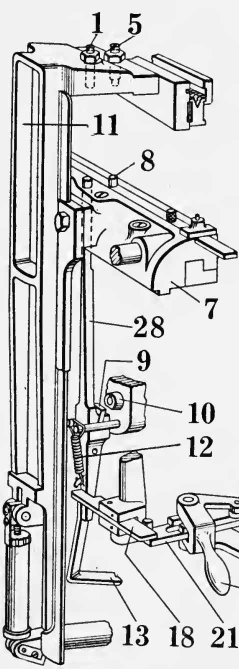
Movements of the First Elevator.—The first elevator in making its various movements, normally has four strokes; the first stroke takes place when it carries a line of matrices from its position opposite the delivery channel down to the vise cap, a distance of about five inches; this is called the casting stroke of the slide. The second stroke occurs when the cam, through the lever, causes the elevator to rise about .010″ for alignment. The elevator then makes its third stroke when ascending from casting to transfer position, a distance of about thirteen inches. The fourth stroke is made when the elevator descends from transfer position to its original place opposite and in align-

ment with the delivery channel, a distance of about eight inches, ready to receive another matrix line. A fifth stroke may be called abnormal, which occurs just after the cast between strokes two and three. If adjustment of the first-elevator banking screw for .010″ space between it and the vise cap exceeds .010″ after the first elevator has risen for letter alignment, the elevator will fall slightly as the mold disk retreats with the slug from the matrix line after the cast.

Downstroke Banking Adjustment

This adjustment is made with *new and unused pi matrices*. Send over a 30-em line of matrices containing no spacebands. If the adjustment is made with used matrices having worn toes, the adjustment will not be correct for new matrices. On the other hand, used matrices will work satisfactorily when the adjustment has been properly set with *new* matrices.

Disconnect the pot pump plunger rod pin, start the machine, and stop it when the elevator rests upon the vise cap. Adjust the center screw in the top of the slide (the screw farthest back) until there is about .010″ vertical shake in the elevator slide. This can be verified by passing a piece of metal or feeler gauge .010″ thick, between the vise cap and the bottom of the adjusting screw when the elevator has risen under compression for alignment. While the elevator is under compression in this position, hold a light at one side of the vise and look through between the screw and vise cap. Some space should be visible.



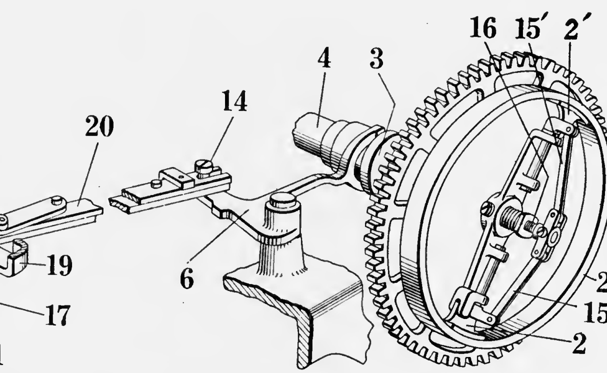


FIG. 44.—First-Elevator Slide and Vise Automatic Details, showing how the vise automatic stops the machine when the downstroke of the first elevator upon the vise cap is obstructed, as in the case of an overset matrix line which will not enter between the vise jaws.

Normally, the first-elevator slide *11* descends to position the matrix line between the vise jaws, and is stopped in its downstroke by the banking screw *5*

striking the top of the vise cap *7*. Just before the banking screw *5* strikes the top of the vise cap *7*, the vise automatic stop rod adjusting screw *1* at the top of the elevator slide *11*, depresses the vise automatic stop rod *28* projecting through the vise cap *7*. The stop rod *28* is suspended by the spring *12*. The action of the screw *1* depressing the stop rod *28* causes the pawl *9* to clear the dog *10* as it is being urged forward by the advancing mold disk, and the machine will continue to revolve as though the vise automatic stopping device were not present in the mechanism.

If an overset matrix line is contained within the first-elevator jaws, the elevator is stopped in its descent before the screw *5* in the top of the slide *11* banks upon the vise cap *7*. When this occurs, the stop rod screw *1* cannot depress the vise automatic stop rod *28*, and the pawl *9* in the rod is engaged by the dog *10* in the vise frame, which throws the lower end of the stop rod *28* against the lever *18*; the lever *18* in turn swings against a lug on the outer end of the stop bar *21*; at its rear end the stop bar *21* engages a shoulder screw *14* in the forked lever *6*; the forked lever turns through a small arc of a circle and engages the flange *3* upon the driving shaft *4*; the flange *3* is connected to a rod *16* running through the hollow outer end of the shaft *4*; the pressure of the forked lever *6* against the flange *3* causes the clutch arm shoes *2* and *2'* to be released from the inner rim of the driving pulley *27*, through their connection to the rod *16* by the links *15* and *15'*.

Before the mold disk makes its forward stroke to ejecting position, the extension *13* fastened to the lower end of the vise automatic stop rod *28* is engaged by the vise jaw closing lever in order to pull the stop rod pawl *9* downwardly so the clutch will not be thrown out of action as the dog *10* is pushed forward by the advancing mold disk.

The alignment stop *8*, upon being moved a short distance to the right, registers with the banking screw *5* at the top of the first-elevator slide *11* in order to present a matrix line resting in normal position in the first-elevator jaws, to the mold in auxiliary position so that bold face or italic characters may be cast upon the slug. This stop *8* is also used when casting 18 point or larger type faces, which are punched in auxiliary position upon the edge of the matrix body.

The stop rod extension *13* is not applied on those machines having two-pocket mold disks.

Adjustment of the downstroke banking screw for .010″ clearance between the mold and matrix line, once having been made, should last indefinitely. If, at any time, there seems to be more than .010″ play, note whether the locking studs in the mold disk or the stud blocks in the vise frame need replacing on account of play.

As previously explained, when the first elevator rests upon its banking screw *5*, Fig. 44, on the vise cap, the vise automatic stop rod pawl must just clear the advancing vise automatic stop mold disk dog. Adjust with the front screw *1*, Fig. 44, in the top of the first-elevator slide until the advancing dog *10* in the vise frame passes over the stop rod pawl *9*. After having made this adjustment, lay a thin space matrix on the vise cap at the exact spot where the elevator slide banking screw *5* strikes; pull the controlling lever; the machine should stop when the dog *10* strikes the pawl *9* in the stop rod *28*.

Normally, the stop rod pawl *9* should rest about 1/32″ above the lower edge of the mold disk dog *10*. The spring *12* suspends the stop rod *28*, and its upper position is limited by a shoulder on the rod under the vise cap, the pin extending through a hole in the vise cap.

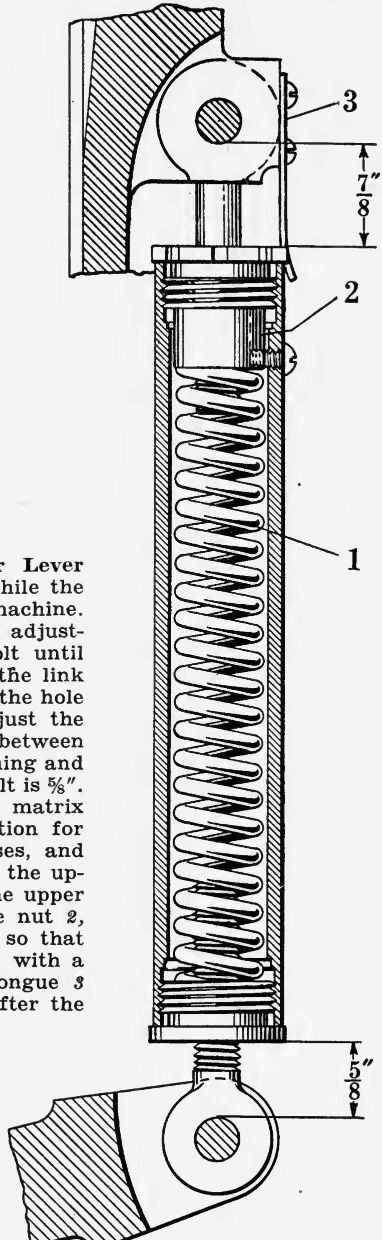


FIG. 45. — The First-Elevator Lever Link adjustments are made while the link is disconnected from the machine. These are called assembling adjustments. Turn the upper eyebolt until the space between the top of the link casing and the bottom edge of the hole in the bolt measures ⅞″; adjust the lower eyebolt until the space between the lower edge of the link bushing and the upper edge of hole in eyebolt is ⅝″. Before the cast, in making matrix alignment, and again at position for transfer, the first elevator rises, and through the link presses up on the upper eyebolt passing through the upper link bushing screwed into the nut *2*, bearing against the spring *1*, so that the elevator comes to position with a cushion stroke. The spring tongue *3* holds the casing in position after the adjustment has been made.

Adjustment of the vise automatic is extremely important. It is a valuable safety device, but is not intended to be called into play when the operator wants "to see whether a matrix line will enter the vise jaws."

Upon adjusting the vise automatic, and it is found that it does not function as it ought, see whether the dog spring is broken. If broken, it cannot push the dog back into place when the mold slide retreats after the cast. Rounded striking edges on the stop rod pawl and the dog will sometimes prevent proper throw-off of the machine.

If the mold disk advances so far forward that the mold has contact with the matrix line before the vise automatic shuts off the machine on a tight line, possibly the clutch adjustments are out of order. The 1/32″ space between the forked lever and flange should be maintained, as well as the 15/32″ space between the clutch shaft bearing and flange while the machine is in action.

Auxiliary Lever Adjustment

The auxiliary lever will rarely, if ever, need to be readjusted unless the jam nut for the adjusting screw has worked loose or in case its position has been deliberately altered. In this case the alignment of the first-elevator jaws with the delivery channel rails will be out of order and it will appear that the connecting link adjustment is also out of order. To restore the auxiliary lever adjustment, first see that the connecting link eyebolts are in their proper relationship to the casing caps, as shown in Fig. 45. Replace the link, and while the machine is standing at normal position, move the auxiliary lever adjusting screw until the grooves of the first-elevator jaws are a trifle lower than the corresponding grooves in the delivery channel rails. Then tighten the adjusting screw jam nut and the auxiliary lever connecting screw which binds the two levers together. The adjustment having been made in this manner, will provide proper alignment of the grooves in the first-elevator jaws with those of the delivery channel rails, and also proper clearance of the first-elevator auxiliary lever cam roller with the depression in the first-elevator cam at the time the elevator is seated upon the vise cap previous to the advancement of the mold upon the matrix line.

First and New Style Gibs

The first style method of holding the first-elevator slide in vertical position employs four separate gibs. The two upper gibs can be used to align the jaws with the delivery channel. The two lower gibs can be used for adjustment when the first elevator is at transfer position. Position the gibs so the first elevator will descend without friction from the transfer cap. A careful adjustment of the gibs should be made so that the first-elevator jaws will not be out of parallel with the mold. If out of line, the draw of the letter characters will be at an angle to the constant or smooth side of the slug, and will make it difficult to obtain a good setting of the side trimming knives. This angular condition might in all probability be caused by misadjustment of the two lower gibs.

First Elevator—Mold Alignment Test.—Test for alignment by placing a *new* thin pi matrix in each end of the first-elevator jaws. Run the machine ahead until the first elevator rests upon the vise cap. Disconnect the mold cam lever from the mold slide and pull the mold disk forward to engage the locking studs with the stud blocks in the vise frame. The lower back lugs of the two pi matrices will then be in engagement with the aligning groove in

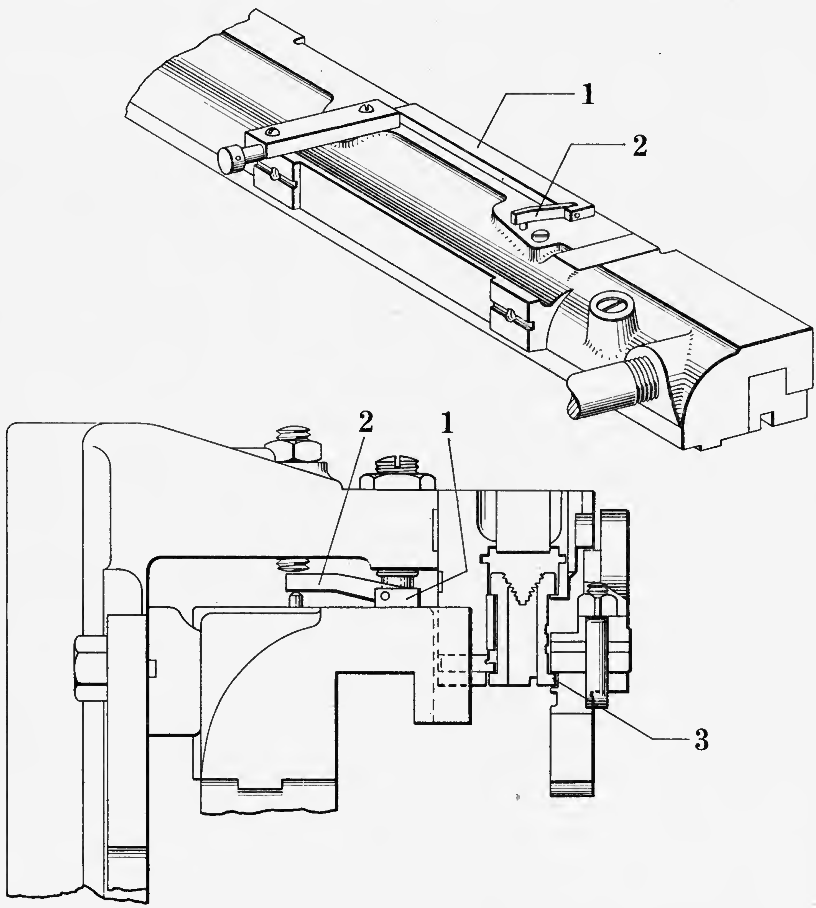


FIG. 46a.—First Style First-Elevator Slide Filling Piece. All display matrices, 18 point and larger, are punched in auxiliary position; they are delivered to the first elevator upon the normal aligning rail and presented to the auxiliary aligning groove of the mold. This filling piece *1* causes the matrix line to stop at auxiliary position in front of the mold.

The extension *2*, attached to the filling piece *1* closes the gap between the vise automatic stop rod screw in the top of the first-elevator slide and the upper end of the vise automatic stop rod.

the mold. Tap the mold disk back about .010″ away from the first elevator and pull the first elevator up by hand. While holding the elevator up, each matrix will bind equally if the two lower gibs have been properly set. Use a pair of tweezers to test the snugness of the matrices.

Adjustment of New Style First-Elevator Slide Gibs.—There are only two gibs in the new style means of guiding the first-elevator slide, one for each side, running from top to bottom of the vise. The right-hand gib is doweled and fixed as to location. The left-hand gib is adjustable. Allow about .005″ clearance between the gib and slide.

Back Jaw Supports

On all Intertypes, a support is provided to prevent deflection of the first-elevator back jaw. This is intended to remove the possibility of springing the jaw when the slug is breaking away from the matrix line or border slide, immediately after the cast.

The first style support is swung out of the way when the mold slide is to be pulled out. It is held in place by a screw at the top of the support, and a pin at right angles to the line of strain projects into a hole in the left side of the delivery channel back plate.

The new style support consists of a hooked bar mounted on the vise cap and is held rigidly by two screws. Unlike the first style support, it is fixed as to position. The new style support is indicated at *10,* Fig. 47.

Fitting Back Jaw and Separating Block

Due to careless handling of the machine, accidental springing of the back jaw (if not badly sprung) can be rectified by using a small iron block or piece of lead base at the point of the kink; then apply a small vise to the open end and compress the back jaw toward the front jaw. Several trials may be necessary, using a *new* pi matrix between trials, to see how much progress has been made. Particularly watch the lower lip of the back jaw to see that it is square with the jaw body. In rare cases, it is necessary to remove the jaw from the machine and work on it in a strong bench vise, with three L-shaped brass pieces (two on one jaw of the bench vise at either end, and one in the center of the other bench vise jaw). Never hammer a first-elevator back jaw in trying to straighten it.

If the back jaw is out of line vertically with the front jaw, matrices will not be supported by both upper ears while hanging in the first elevator. Pien one side of the key in the separating block slightly, according to which direction the jaw is out of line; then dress the other side of the key lightly with a fine file. Before manipulating the separating block key, make sure the supporting rail of the back jaw is straight and true relative to the front jaw. Perhaps it would be better for an inexperienced person to consult one who knows how to do work of this nature the first time such a fitting is needed. In making tests to see how the work is going, use a *new* and *unworn* pi ma-

trix. In no case should the back jaw matrix supporting lip be higher than the top edge of the adjusting bar.

First-Elevator Slide Filling Piece

First Style Two-Letter Attachment.—The first two-letter attachment was introduced in connection with display and head-letter matrices from 18 point on up to the larger sizes. Display matrices from 18 point up are punched in auxiliary position and have but one character in their casting edges. To cast slugs from these matrices, it is necessary to provide a means of presenting them to the high alignment groove at the front of the mold, otherwise the characters would overhang the slug on both sides, were it possible to cast them in normal position. One-letter display matrices are assembled in the assembling elevator on the normal rail and are also carried in the first elevator in the normal or roman alignment position. To present the matrix line to

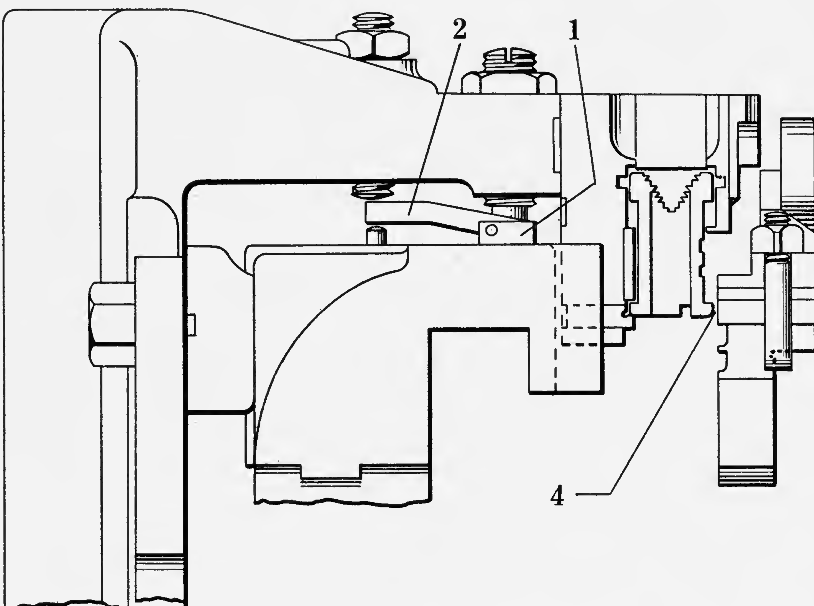


FIG. 46b.—First Style First-Elevator Slide Filling Piece. When the operator composes a matrix line upon the assembling elevator duplex rail and delivers it to the first elevator on the same level, the matrices will be in auxiliary position. Should he neglect to turn the first style filling piece back out of the way, the first elevator will bank upon it and present the matrix line to the mold so that the lower back matrix lugs will be mashed by the mold face, as indicated at the point *4*. A front squirt may also result because there will be an open space between the front of the mold cell and the matrix line, through which metal will flow.

the mold, the two-letter attachment shown in Fig. 46a is used. The bar *1* is swung under the first elevator by means of the knob. The small projecting hinged extension *2* takes up the difference in space for the vise automatic when the attachment is in operative position. A sectional view of the first elevator being supported by the two-letter attachment *1* is shown. It will be noticed that the matrix is in normal position in the first-elevator jaw, but the lower back lug of the matrix enters the high alignment groove in the mold, at *3*. The two-letter attachment bar is approximately .218" thick for most American machines, or the difference in the space represented between the normal and high alignment points of the mold.

The two-letter attachment is a valuable device when used in connection with large amounts of italic or bold-face composition in the smaller sizes of type. It permits the operator to assemble all matrices in normal position in the assembling elevator without the use of the duplex rail.

Should the operator set a line of matrices upon the assembling elevator duplex rail, and have the two-letter attachment in position on the vise cap, the lower back matrix lugs will be struck by the mold—that part of the mold face between the casting cell and the high alignment groove *4*, Fig. 46b. Matrix toes will be damaged when this occurs; the machine may stall, or a front squirt might result—the metal flowing between the matrix line and the mold face. Matrices assembled on both alignment levels cannot be cast when the two-letter attachment is in position on the vise cap.

Fig. 76, page 142, describes in detail a new device to prevent damage to matrix lugs under these conditions.

First-Elevator Alignment Stop Bar

New Style Two-Letter Attachment.—The purpose of the first-elevator alignment stop bar is identical in all respects to the first style two-letter attachment, just described in the foregoing paragraphs, except that it has been so designed that an operator cannot assemble a line of matrices on the assembling elevator duplex rail *6*, Fig. 47, when the stop bar *1* is in operative position. This prevents a squirt or accident to the machine parts and does away with the human element in watching to see that the attachment is not in position when assembling matrices on the duplex rail. In Fig. 47, *1* is the stop bar which rests in a groove in the top of the vise cap. The pin *7* locks the bar *1* in one of the positions for which it has been set. If it is desired to use the stop bar, the pin *7* is lifted and the bar *1* pushed to the right by the handle *9;* during this operation, a pin in the bar connected with the duplex rail stop plate *8* swings the plate behind the duplex rail lever rod stop lever *5*. A spring under the pivot screw at *4* serves as a friction to hold the stop plate *8* in position when the vise is opened.

When the stop bar is not in operative position, the first-elevator banking screw, before the cast, rests on the stop bar *1,* which is level with the top of the vise cap, but when the bar *1* is in use, the screw strikes the top of the

alignment stop *2*. This alignment stop is made with different alignment heights, the same as molds vary in alignment grooves, for use on machines shipped to all parts of the world.

The little hinged extension *3* is interposed between the adjusting screw at the top of the first-elevator slide and the top of the vise automatic stop rod. It takes up the difference in space between the parts while the stop bar is in use.

Pump Stop Pot Block

On machines not equipped with the mold cam safety lever, a small adjustable block is mounted at the rear of the metal pot jacket cover. This is

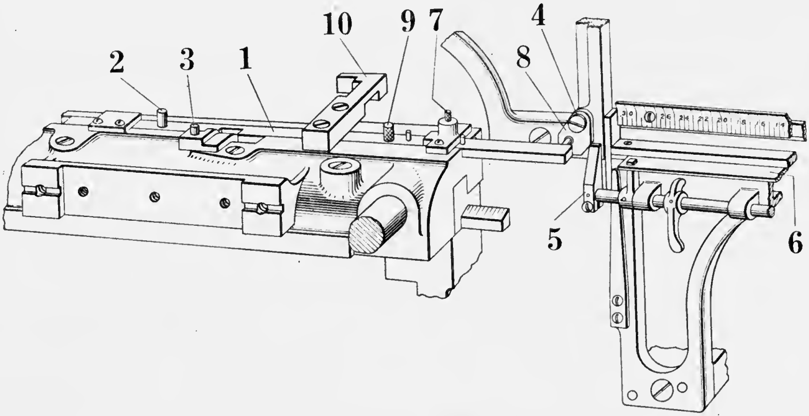


FIG. 47.—First-Elevator Alignment Stop Bar. Display matrices from 18 point up (except advertising figures) are punched in auxiliary position and have but one character in their casting edges. To cast slugs from these matrices, it is necessary to provide a means of presenting them to the auxiliary alignment groove at the front of the mold. Display matrices are supported in the first elevator on the normal or roman alignment rail. This alignment stop bar is used to hold the first elevator in high alignment or auxiliary position on the vise cap, and the lower back matrix lugs register with the upper aligning groove in the mold face.

The stop bar *1* rests within a groove in the vise cap. The pin *7* locks the bar in one of the positions for which it has been set. To use the stop bar, the pin *7* is lifted and the bar *1* is pushed to the right by the handle *9*. A pin in the bar *1* connected with the duplex rail stop plate *8*, swings the plate behind the duplex rail lower rod stop lever *5*. A spring under the pivot screw at *4* serves as a friction to hold the stop plate *8* in position when the vise is opened so that the hole in the plate will register with the pin in the end of the stop bar while the vise is being closed.

The purpose of the stop plate *8* is to prevent the operator assembling a matrix line upon the duplex rail *6* while the bar stop *2* is in register with the first-elevator downstroke banking screw.

If the operator would send a matrix line to the first elevator upon the duplex or high alignment rail while the bar stop *2* was in place under the elevator banking screw, the lower back matrix lugs would be struck (and possibly mashed) by the front of the mold—that part of the mold face between the casting cell and the high alignment groove. Front squirts are thus avoided by the protection afforded by the use of the stop plate *8*.

intended to obstruct the plunger when an operator forgets to properly set the first-elevator slide filling piece or stop bar. Naturally, when this occurs, the first elevator is positioned too low when a display mold is being used, and the mold cap will bind against the first-elevator back jaw, or in the case of a line sent over on the high alignment rail with the attachment in position, the lower back matrix lugs will prevent the mold disk and metal pot making full forward stroke. Then the pump stop pot block will not clear the pump stop lever catch block mounted on the pot pump lever, and a front squirt will be avoided. The block is ajustable for safety position so that when the pot locks normally against the mold, the block will just clear the pump stop lever catch block on the pot pump lever.

Causes of Interference with Complete Downstroke of First Elevator

An overset line.

Vise jaws set for narrower measure than assembler.

Assembler measure wider than vise jaw measure.

First-elevator duplex rail cap screw has worked loose and protrudes.

A binding first-elevator duplex rail.

Spring for duplex rail broken and fails to pull the rail fully back to its seat after the transfer.

Matrix or spaceband lodged on the vise cap or in the space between the vise cap and the jaws.

A binding knife wiper rod.

The knife wiper caught on a defective slug which has partly pulled back between the knives after ejection.

First style knife wiper improperly adjusted for clearance at downstroke of the first elevator.

A first style line stop leg (one side) out of position.

On the first-elevator jaw, fitted with the first style closing pin, the cam on the upper right-hand gib has not seated properly, and the pin remains within the jaw.

Gummy accumulation on back surface of vise cap and front side of vise jaws. Wipe the parts clean with a cloth and gasoline.

Removing a Front Squirt

A squirt consists of metal that has escaped the confines of the mold cell, flowing over the parts, either at the front or rear of the mold.

While it is not intended that metal squirts of any kind should occur, nevertheless a machine will squirt when some abnormal circumstance arises. This may be when the operator wilfully forces an overset matrix line into the vise jaws, because he is too shiftless to divide a word and thin-space the line, or because of misadjustment of the parts; or the vise automatic is not functioning as it should; or a matrix or spaceband may have lodged unnoticed in the

vise cap in such a position that a metal-tight lockup between the mold and matrix line cannot be had. Again, in a loosely-spaced line one or more of the end matrices may squabble—that is, assume an angular position to the others of the matrix line, through the opening of which the metal can flow.

On machines that are equipped with the first style two-letter first-elevator slide filling piece, the operator may send over a line in auxiliary position, and in addition may have thrown the hinged filling piece under the first elevator. This will cause the matrix line to be held so high that the lower back matrix lugs will have contact with the front of the mold just under the casting cell and above the aligning groove. This prevents a tight seal between the mold and matrix line, causes a front metal squirt, damages matrices, may stall the machine, and sets up a strain between the parts which will not do the machine any good.

A device has been applied to Intertypes for some time past which prevents the operator forgetting to throw the filling piece or new style stop bar from under the first-elevator head when using the duplex rail, either in whole or in part, in the assembling elevator, and is known as the first-elevator alignment stop bar. It is explained fully in connection with the section treating upon the first-elevator slide. See Fig. 47.

The major problem in cleaning out a front squirt is to remove the metal in such a way as not to damage the mold or first-elevator jaws.

As soon as the squirt is noticed, shut off the controlling lever.

If the vise cannot be opened, perhaps metal has gathered around the back jaw support. Take out the screws in the support and the two screws at the left of the elevator head, after which the back jaw can be released by gently prying with a *blunt* screwdriver. Do not force the back jaw, as it can be sprung easily, in which case trouble will be had with the lockup and also the transfer of matrices from the first-elevator jaw to the second elevator. The metal-bound matrices can be lifted from the front jaw. If metal has entered the aligning groove of the duplex rail, use nothing harder for its removal than a piece of six-point brass rule, and with a small pig of metal or brass hammer tap the metal strip out endwise to the right side of the duplex rail.

In replacing the back jaw, match the left end evenly with the separating block and the front jaw. Never pound a back jaw to the key of the separating block. Squeeze the block and back jaw together by gentle pressure with the hands. Use a new pi matrix to test the space between the front and back jaws. If the back jaw has been assembled correctly with the separating block, and it seems to be slightly sprung, grasp the open end of the jaws and exert some pressure to bring it in line with the front jaw again.

In removing metal, great care must be exercised not to nick or damage the face of the mold or the aligning rail grooves. Sometimes it is better to take the mold body from its pocket in the disk in order to remove metal from the locking stud hole. Upon returning the mold body to its pocket, first wipe the

mold base and pocket in the disk to remove any small particles of metal or dirt which would throw the mold out of proper alignment.

Always use a piece of brass rule for the purpose of removing metal squirts. This rule is procurable in all composing rooms.

If matrices are metal-bound, especially in the tooth recess, to such an extent that they cannot be separated with the fingers, tie a cord around the bunch and dip only as far as necessary in the metal pot. Spacebands should always be immersed in cool water and polished with graphite after separating from the matrices in this manner. Unless this is done, the heat of the metal will likely draw the temper, making them unfit for use, because they will not stand the strain of justification.

Chapter XIII

THE VISE

The vise frame, or vise, as it is called, occupies the left front portion of the machine and is a part of the casting apparatus. There are three bridges in the casting, to the upper part of which is fastened the cap.

The vise supports the first-elevator slide, the vise jaws, mechanism for setting the left jaw, vise jaw closing and justification apparatus, the knife block, the stud blocks to rigidly hold the mold disk in position, the vise automatic, the front mold wiper, the slug galley and the lever which jogs the slugs after they have been delivered into the galley. The vise takes the forward thrust of the mold when the metal pot mouthpiece is locked against it from the rear.

The vise is hinged at its lower extremity on a shaft that also supports the pivoted legs of the metal pot. In order to provide a means of opening the vise for the purpose of making liner changes or attending to repair work, two locking handles, threaded into the vise cap, clamp the vise at the top of the machine frame. On the end of each vise locking screw handle there is a lip or cam. The cam on the right-hand locking screw engages a stud mounted above and to the right of the mold disk, and the left-hand locking screw engages a stud in the mold gear arm at the left.

Opening the Vise to First Position

There are two positions to which the vise can be opened. To open the vise to first position, merely turn the left- and right-hand locking handles and let the frame down until it is supported near the lower end by the frame rest stud. With the vise in this position, the mold disk can be pulled out a distance of about two inches by first releasing the mold cam lever handle.

Opening the Vise to Second Position

To open the vise to second position, Fig. 71, start the machine and shut off the controlling lever as the first elevator seats upon the vise cap, and before the mold disk has moved forward. Open the vise to first position by turning both locking handles, and lower the vise until supported by the frame rest. With the machine in this position the vise can be lowered to second position because the first-elevator lever roller will be opposite the lowest depression in the first-elevator cam, and when the vise is let down, the weight of the vise frame and first-elevator slide will not be taken by the lever. Next, hold up the vise slightly and pull out the knob to retract the vise frame rest in the machine base. After the lug at the bottom of the vise frame has passed the rest, release the rest knob, which will be moved back to original position by a

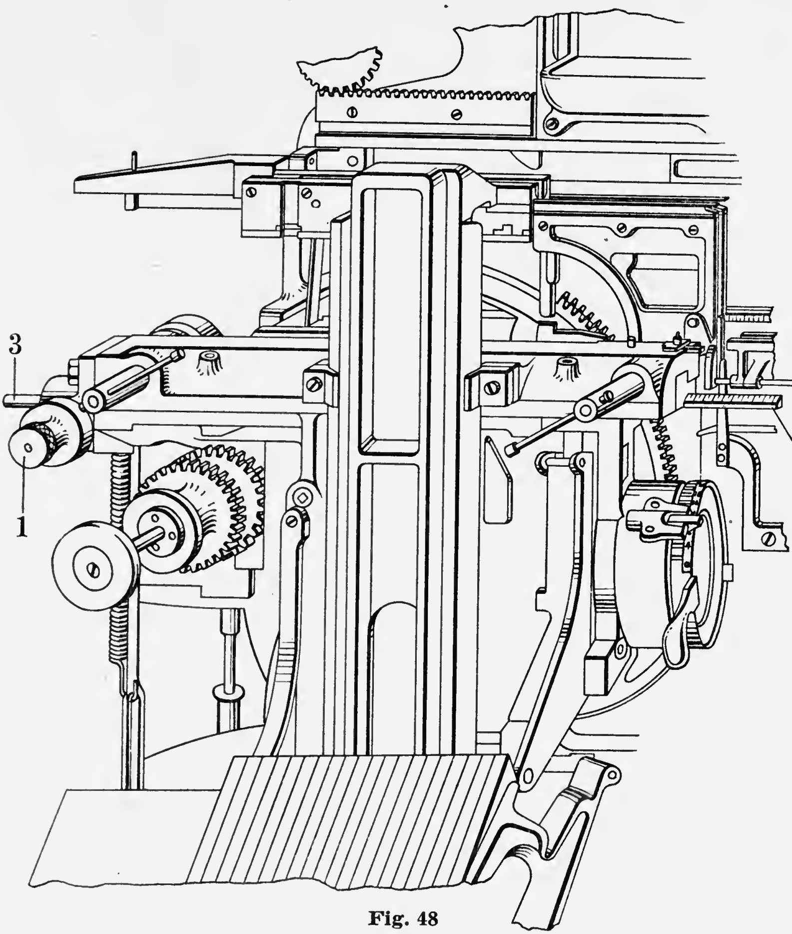


Fig. 48

FIG. 48.—To make a change in vise jaw length, the operator pulls out the adjusting knob *1*, and turns it right or left, according to the vise jaw measure desired. Upon releasing the knob, a spring automatically returns it to place and locks the adjustment. The em measure is indicated by the scale *2*, extending through at the right of the vise cap, above the knife block near the operator, where it can easily be seen.

spring; then let the vise down again until it engages the frame rest. Disconnect the mold cam lever handle to disengage the cam lever from the mold slide. Disconnect the ejector lever link by taking out the wing pin which connects it to the ejector lever, disengaging the link from the ejector slide, and lift it out of the machine. The new style ejector lever link is notched to fit over the wing pin where it engages the wing pin in the lever and has an ex-

tension to serve as a handle when lifting it out of the machine. The mold disk may now be pulled forward away from the metal pot. The mold slide may be removed from the machine while the vise is in this position.

Justification of Matrix Line

The first elevator, having made its downstroke to the vise cap, positions the matrix line between the vise jaws, and after the mold has advanced to the matrix line so that the lower back matrix lugs engage its aligning groove, the spacebands are driven up, to expand the line so that it will be filled out tightly and exactly to the limits of the space between the jaws and each line of the measure being set will be of the same length.

Justification of the Line by means of the spacebands also serves the purpose of making a tight seal between the matrices and spacebands so that no metal can enter between the letters. The matrix lines vary as to length and the spacebands take up the difference in length between the line and the open space between the vise jaws. These spacebands or long wedges extend a considerable distance below the bottom of the matrices and are driven up by the justification bar, *7*, Fig. 49. This bar is actuated by two rods running through

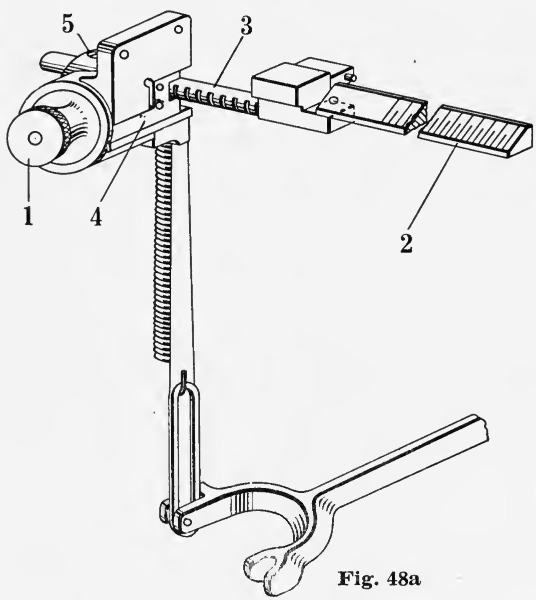


Fig. 48a

FIG. 48a.—The rack *3* has notches cut in its face, meshing with a pinion, *15*, shown in Fig. 53, and connected at its opposite end with a knob *1* (shown in this figure) which regulates the position of the left vise jaw. The notches in rack *3*, Fig. 48a, are spaced one 12-point em apart, and half-em (or en) measures are obtained by the detent *4* registering with the notches at the underside of the rack *3*.

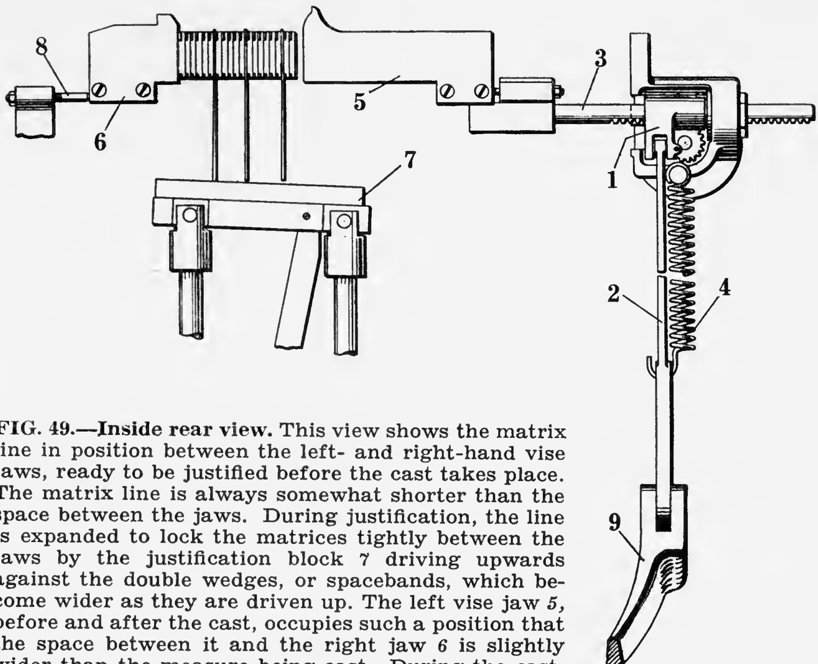


FIG. 49.—Inside rear view. This view shows the matrix line in position between the left- and right-hand vise jaws, ready to be justified before the cast takes place. The matrix line is always somewhat shorter than the space between the jaws. During justification, the line is expanded to lock the matrices tightly between the jaws by the justification block *7* driving upwards against the double wedges, or spacebands, which become wider as they are driven up. The left vise jaw *5,* before and after the cast, occupies such a position that the space between it and the right jaw *6* is slightly wider than the measure being cast. During the cast, the arm screw *1,* actuated by the rod *2* through the spring *4,* as the lever *9* rises, moves the jaw *5* slightly in against the matrix line so that the space at the moment will be exactly the even length of the measure desired. After the cast, the arm screw *1* retracts the rack *3,* slackening its pressure against the left vise jaw *5,* when the vise jaw closing lever *9* is lowered by the action of the justification cam, so that the tightly justified matrix line will be loosened and can be easily lifted out of the jaws *5* and *6* by the first elevator. The right-hand vise jaw *6* banks against the screw *8* and is fixed as to position.

supports in the vise frame and the rods are connected to and receive their impetus from two long levers extending from the back of the machine under the main cams. Two very large and powerful springs urge the levers up as the cam contours permit. The bar or block 7 makes two separate strokes in driving the spacebands up. The first time the block makes its upward thrust at an angle and then retreats. In coming up the second time against the spacebands, its position is tilted, so that it first strikes the spacebands which project down the farthest. This makes a tighter seal between the matrices and spacebands than could be obtained if the spaceband wedges were driven up equally. In making its second stroke, the block may only strike two or three of the long wedges at the left side of the matrix line. Coincident with the movements of the spaceband justification block a device called the vise jaw closing mechanism, operates the left vise jaw. Just as the justification bar makes its first upward stroke, the vise jaw closing screw, *1,* Fig. 53, operating

through a left-hand screw thread, turns with a circular motion and slightly closes in the left vise jaw towards the matrix line. When the left vise jaw is resting at normal position, the space between it and the right-hand jaw is a trifle wider than when the line is justified. This arrangement is provided so that after the slug has been cast and just before the first elevator lifts the matrix line up from between the vise jaws, the vise jaw closing arm screw *1* will be caused to release the tension of the lockup by moving the left jaw away from the matrix line a little. The loosened matrix line can then be lifted from the jaws by the first elevator without friction or jerk.

Adjusting the Vise Jaws

The right-hand vise jaw is adjusted for constant position by means of the screw *8*, Fig. 53, in the top of the knife block. This jaw has a slight idle movement, but is constant as to position during the locking of a matrix line. It

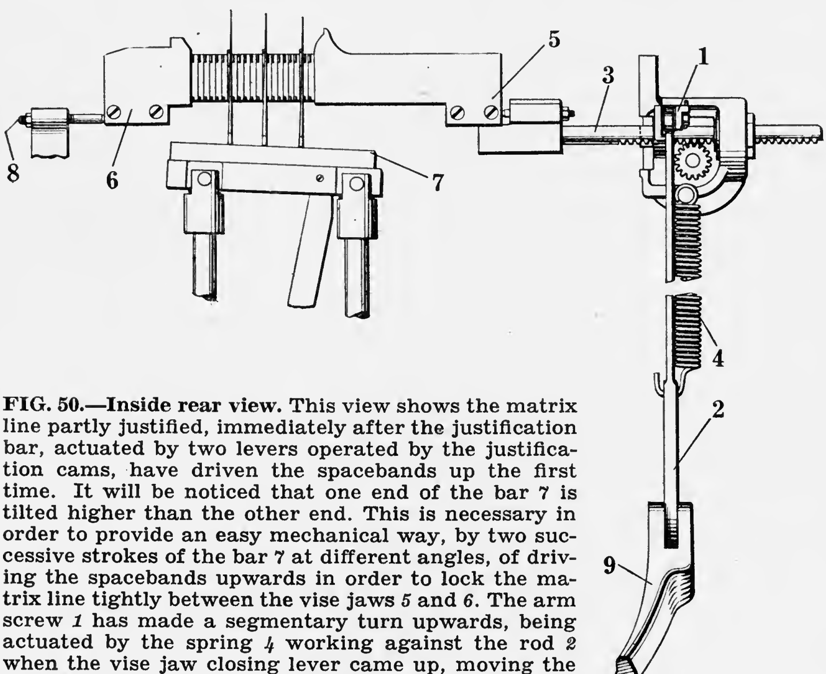


FIG. 50.—Inside rear view. This view shows the matrix line partly justified, immediately after the justification bar, actuated by two levers operated by the justification cams, have driven the spacebands up the first time. It will be noticed that one end of the bar 7 is tilted higher than the other end. This is necessary in order to provide an easy mechanical way, by two successive strokes of the bar 7 at different angles, of driving the spacebands upwards in order to lock the matrix line tightly between the vise jaws *5* and *6*. The arm screw *1* has made a segmentary turn upwards, being actuated by the spring *4* working against the rod *2* when the vise jaw closing lever came up, moving the rack *3* so as to close in the left vise jaw *5* a trifle. The bar 7 will now be lowered and the arm screw *1* will be turned back to its original position by the downward movement of the vise jaw closing lever *9*, releasing the left vise jaw *5*. The bar 7 will again be driven up against the bottoms of the spacebands. After the downstroke of the vise jaw closing lever *9*, the first elevator will be raised about .010″ which action draws the lower back matrix lugs against the aligning groove in the mold face, to align the letter characters so they will all be of even height. This upward tension of the elevator will not be released until after the slug has been cast in the mold.

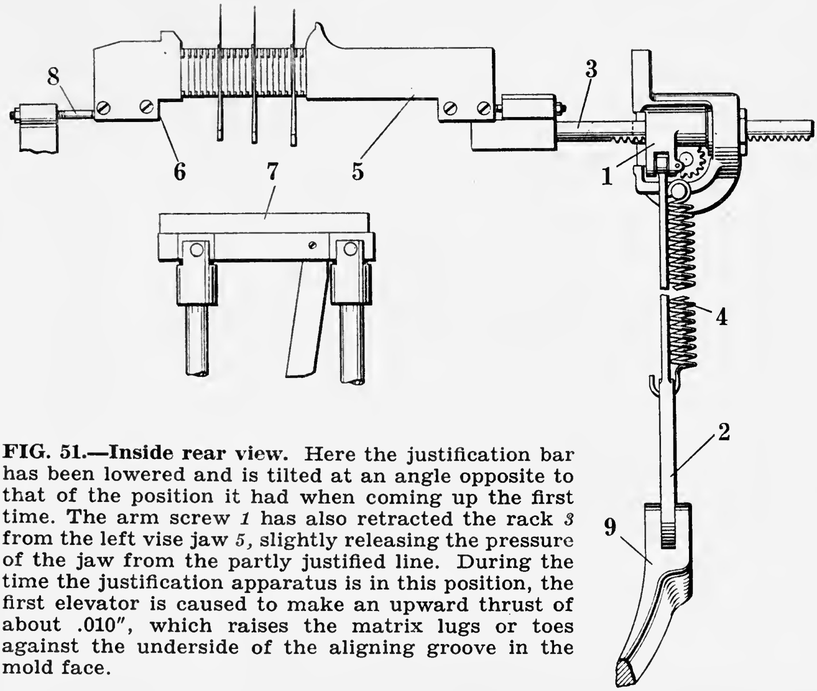


FIG. 51.—Inside rear view. Here the justification bar has been lowered and is tilted at an angle opposite to that of the position it had when coming up the first time. The arm screw *1* has also retracted the rack *3* from the left vise jaw *5*, slightly releasing the pressure of the jaw from the partly justified line. During the time the justification apparatus is in this position, the first elevator is caused to make an upward thrust of about .010″, which raises the matrix lugs or toes against the underside of the aligning groove in the mold face.

should be adjusted to bring the type face flush with the right-hand end of the slug body.

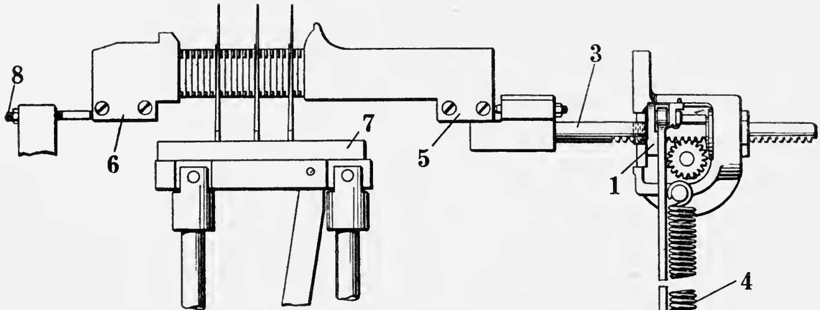
In adjusting the jaws, set up a line having a lower case "h" matrix on the left-hand end and a lower case "d" matrix on the right end of the line. These characters will enable the one doing the adjusting to obtain a close setting of the jaws.

The left vise jaw is adjusted with the screw *10* to bring the type face flush with the end of the slug body.

Whenever the vise jaws have been adjusted, immediately check the adjustment of the assembler slide as explained previously. It is possible that the distance between the two jaws will not be correct in relation to the assembler slide setting.

Vise Jaw Closing Adjustment

It is necessary that the attachment be properly set before adjusting the left vise jaw, for the reason that long use of the machine may have caused a little play between the vise closing block *11*, Fig. 53, and the arm screw *1*. The arm screw works directly against the vise closing block *11*, when operating the left vise jaw *5* during justification, and if this play is not taken out,



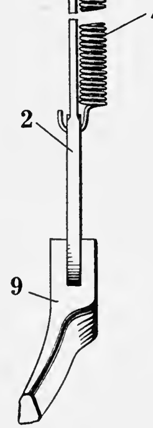


FIG. 52.—Inside rear view. This view of the justification mechanism shows the final lockup of the matrix line. The arm screw *1* has caused the rack *3* to move the vise jaw *5* slightly in again when the vise jaw closing lever *9* permitted, through its connection with the rod *2* and the tension of the spring *4*. The justification bar *7* has driven the spacebands upwards at a slightly different angle, first striking the lower ends of those spacebands in the opposite end of the line that were not driven up as high during the first stroke. The second stroke of the bar *7* may be exerted against only one or two of the spacebands. The difference in the graduated spacing between the words, caused by the angular stroke of the bar against the spacebands, will not be perceptible to the eye.

the type face will overhang the left end of the slug body of closely justified matrix lines, and a good adjustment of the left vise jaw with the screw *10* will be impossible.

Proper adjustment of this attachment is as follows:

Release the set screw *5*, Fig. 48a, at the top of the bracket, and turn the adjusting screw bushing *13*, Fig. 53, so that the vise jaw closing connecting rod *2* can be raised to full stroke without binding, with just enough clearance between the arm screw *1* and the block *11*, to have free action; while holding vise jaw closing arm screw *1*, outwardly, tighten the set screw in the bracket. Adjust screw *10* in the block *11* until the type face is flush at the left end of the slug body. The test for this adjustment is made with a line in the first-elevator jaws. When second justification of the line is made, there should be no shake in the vise jaw closing rod *2*. If the adjustment has been properly made, the type face in a matrix line containing one spaceband will not crowd over the end of the line.

The screw bushing 13 is not to be used to adjust the left vise jaw to cause the type face to be even with the end of the slug. To bring the type face even with the end of the slug adjust the left vise jaw by means of screw *10* in the block *11*.

If a matrix line is filled out so snugly that it is as wide as the vise jaw setting, the arm screw *1* cannot rise to close in the left vise jaw a little. This will cause the type face to overhang the slug body. The operator should make due allowance for the movement of the left vise jaw in spacing out a snug line of matrices.

Recasting Wedge

At *12*, Fig. 53 is shown a small wedge, just in front of the justification block 7. This is intended for use in casting blank slugs, by sliding the left vise jaw *5* against the right jaw *6*. In the left jaw block *5* there is a squared slot having a small taper at one side that corresponds to the angle of the wedge *12* in the justification bar. When the left vise jaw is pulled against the right one, this wedge in the justification bar registers with the square hole in the jaw block and locks them together tightly. The action of the wedge locking the jaws together also obstructs the full upstroke of the justification lever which renders the pump stop inoperative, and permits the plunger to cast a blank slug in the mold.

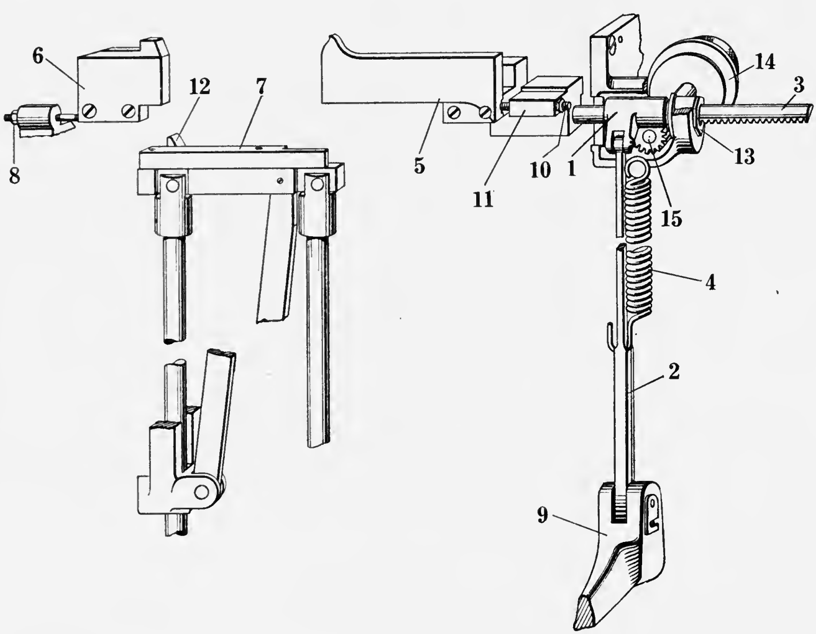


FIG. 53.—Inside rear view. Back view of the matrix and spaceband justification mechanism contained within the vise frame showing the left- and right-hand vise jaws *5* and *6* and the vise jaw closing mechanism. The spaceband justification bar is indicated at *7* and the recasting wedge at *12*.

Effect of Neglected Spacebands

The Intertype Corporation has stressed the importance of polishing spacebands daily in order to remove the small stain or oxide spot that appears on the casting edge of each sleeve after the machine has been in use for several hours. In reading the foregoing text and looking over the various illustrations, it can be readily understood that the pressure exerted by the justification springs upon the spacebands causes a very tight seal between the casting edges of the matrices and spacebands contained in the line. If the oxide stain, or even worse, metal is permitted to accumulate upon the casting edge of the sleeve, owing to neglected polishing of the spacebands, the delicate matrix side walls will be crushed in, and hair lines will appear between the letters. Spacebands must be thoroughly polished every eight hours by rubbing vigorously while laid flat upon an even pine board having some dry graphite sprinkled over its surface. Then the sleeve or short wedge of the spaceband will not injure the matrix walls, and the long wedge will have lubrication to provide easy justification. Spacebands receive severe usage and the strain imposed during justification requires that they get this small but important amount of attention daily.

The Justification Block.—After some time, the justification block may have two highly polished lines in its top surface, caused from striking the spaceband wedges. If these polished lines cause the bending of spacebands, remove the block from the machine and lap crosswise on an oil stone. The fine grained surface produced by the stone will prevent slippage of the bands. In case the bottoms of the long spaceband wedges have become rounded, they can be squared with a fine file. This, however, will not occur until after the machine has been used a long time.

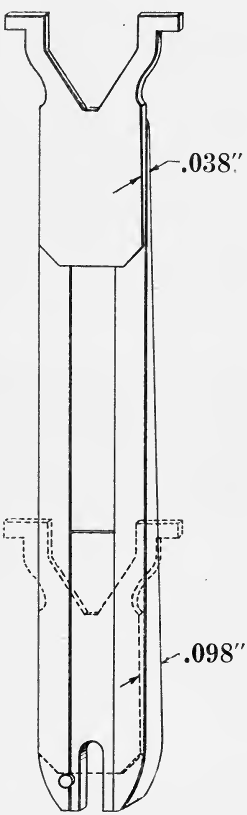


FIG. 54a.—Showing the expansive power of a regular two-letter (thick) spaceband. Between the top and bottom positions of the sleeve upon the long wedge there is a difference of approximately .060", or slightly more than four points.

Thickness of Spacebands

T-668—Extra thin	minimum	.030"	maximum	.091"
T-401—Thin	minimum	.032"	maximum	.093"
T-400—Thick	minimum	.038"	maximum	.098"
T-656—Extra thick	minimum	.048"	maximum	.140"

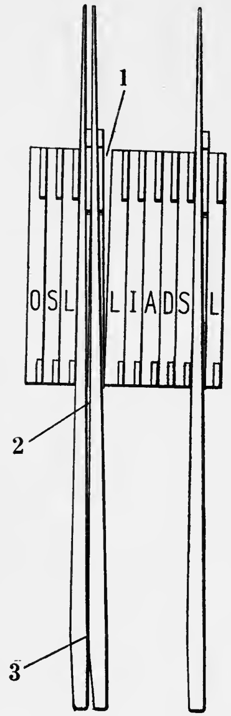


FIG. 54b.—*Two spacebands should never be put together in a matrix line.* When this is done, the two spacebands form one wedge instead of two separate wedges, which will have an opening at the top between the bands and matrices, shown at *1,* into which metal will enter and cast a fin or hairline. If a matrix line is loosely justified, there will also be an opening at *2,* caused by the contact of the bottoms of the long wedges at *3.* If the line is set full the space *2* will be closed in, which will set up an undue strain on the spaceband and will loosen the sleeve, if the operator makes a habit of sending in lines containing two spacebands next to each other.

The reason a spaceband should not be placed at the end of a line without having matrices at either side, lies in the fact that the band might get out of position when going down to the vise jaws.

Justification Springs

Some attention should be given to the tension of the justification springs. When the machine leaves the factory, the spring tension is adjusted for wide composition. The fluted collars *1* and *2*, Fig. 55, are adjustable and can be turned with the hands to secure more or less tension of the springs. After regulating the spring tension suitable to the *general range* of work executed on the machine after installation, it is rarely, if ever, necessary to readjust the fluted collars. The spring pressure should not cause the justification bar to bend spacebands when only one or two are used in a line. On the other hand, a wide matrix line, containing seven or eight spacebands, with about one and one-half ems to justify, should be fully expanded against the vise jaws when the justification levers make their first stroke. Stop the machine at the point where the spacebands have been driven up by the first stroke of the justification block; grasp a spaceband near either end of the matrix line, and if it cannot be pulled up readily, the spring tension will be correct.

If, at any time, you have reason to believe that the justification springs are not driving the spacebands up with sufficient force, it is well, before changing the justification spring tension, to see that the adjustment of the

first-elevator downstroke banking screw, and the forward thrust adjustment of the mold slide are in proper shape. Once in a while some obstruction, such as a loosened mold body screw, might interfere with proper justification of the spacebands at the time the matrix line is being justified.

If it is necessary at any time to remove the justification lever springs, slip a spike or piece of rod in the hole in the bottom of the sleeve, then turn the machine over until the high stroke dip, or depression, of the justification cam is positioned directly over the lever cam roller. Raise the lever by hand,

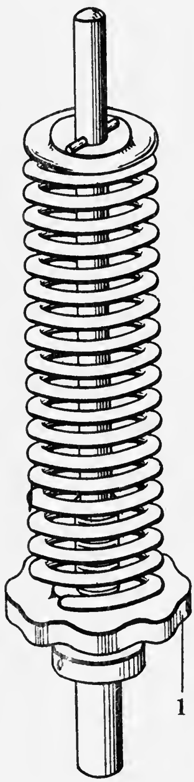
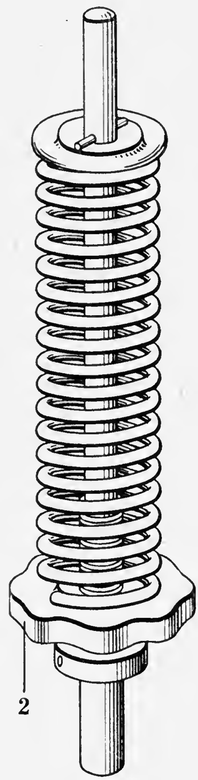


FIG. 55.—Justification lever spring and rod *1*, and the vise jaw closing lever spring and rod *2*. (Rear view.) These springs cause the justification block to justify the spacebands by operating the justification levers as the cam contours permit.

The fluted collars are adjustable and can be turned with the hands to secure more or less tension of the springs. This is explained in the text matter.



and the assembled rod can be lifted from its seat in the base of the machine. When replacing the springs, return the heaviest one to position under the first justification lever (the one nearest the driving pulley), indicated at *1* in Fig. 55. Transposing the springs will cause justification troubles. The vise jaw closing and justification spring is indicated at *2* and is made from the lighter wire.

Vise Jaw Closing Spring Operating Lever

On the forty-two-em Intertype, a means of increasing the tension of the vise jaw closing lever spring is furnished. It requires a great deal more pres-

sure to justify a full forty-two-em matrix line with twenty-five spacebands than a thirty-em line having fewer spacebands. For this reason, a lever called the vise jaw closing lever spring operating lever *2*, Fig. 56, is pivotally mounted on a bracket on the base. Depressing the lever *2* with the foot, until it engages the guide *3*, will raise the collar *1* and compress the vise jaw closing lever spring *4* about one inch. The spring operating lever *2* should be released from the guide *3* before doing short-measure composition.

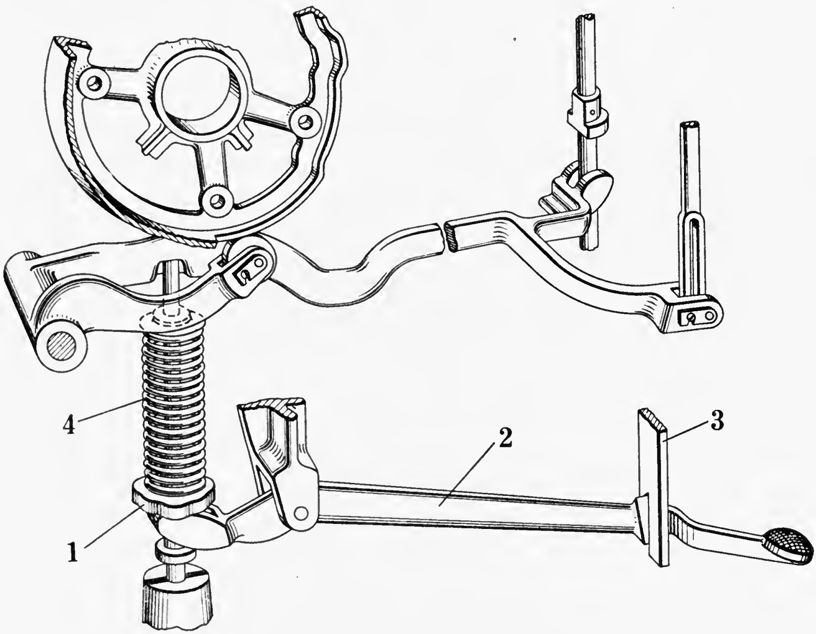


FIG. 56.—Vise Jaw Closing Spring Operating Lever. This device is employed on the forty-two-em machine when casting from matrix lines containing twenty-five or more spacebands.

Chapter XIV

THE MOLD SLIDE AND MOLDS

The principal function of the mold slide is to operate the mold disk through its forward and back strokes when presenting the mold to the matrix line and also to position the mold vertically before the trimming knives for the ejection of the slug from the mold. An arm extending at right angles to the slide carries a bearing which supports the mold disk while making its partial revolutions, first a quarter turn and then a three-quarter turn. The mold slide also houses the ejector magazine and slide.

The mold slide operates in a runway tapered to fit the beveled edges of the slide, at the left of the machine column. The slide has a semi-circular or hooked recess at the rear end, into which fits a roller attached to one side of a lever suspended and pivoted at a point in the pot pump lever bracket above, and to the rear of the metal pot. Another roller attached to the lever on the opposite side fits into a crease in the driving gear and mold slide cam, which controls all forward and back movements of the slide and disk. The lever, suspended at its top end, can be raised and locked in a raised position by a spring pin to disengage the roller from the mold slide so that the slide may be pulled forward or taken from the machine.

The Mold Disk is mounted in a supporting arm or bearing which forms a part of the mold slide. The arm extends out from the slide at right angles. In the center of this arm is a bearing, in which the mold disk stud revolves, a nut on the end of the stud holding the disk snugly to its bearing. This stud and its nut have left-hand screw threads. At the outer end of this supporting arm is placed the back knife, which trims the jet and vent projections that remain on the slug base as the metal pot mouthpiece backs away from the slug after the cast. (Fig. 57.)

The first style back mold wiper is located under the back trimming knife. On the latest machines the back mold wiper is supported by a leaf spring bracket which extends downward and to the right from the mold disk bearing arm, to locate the wiper back of the mold disk under the disk bearing. A guide *6*, Fig. 71, is fastened to the extreme left end of the mold disk supporting arm. This guide, which rests on an adjustable screw in the mold gear arm, also serves as a support for the mold slide.

The Rotation of the Mold Disk is controlled by a small pinion, called the mold driving pinion with which it meshes and which is carried on the end of a shaft mounted in the mold gear arm at the side of the machine. The other end of this shaft has a small spur gear engaging another gear on a short jack shaft inside the mold gear arm. At the rear end of the jack shaft there is a bevel pinion and square block. The bevel pinion has teeth that mesh with long

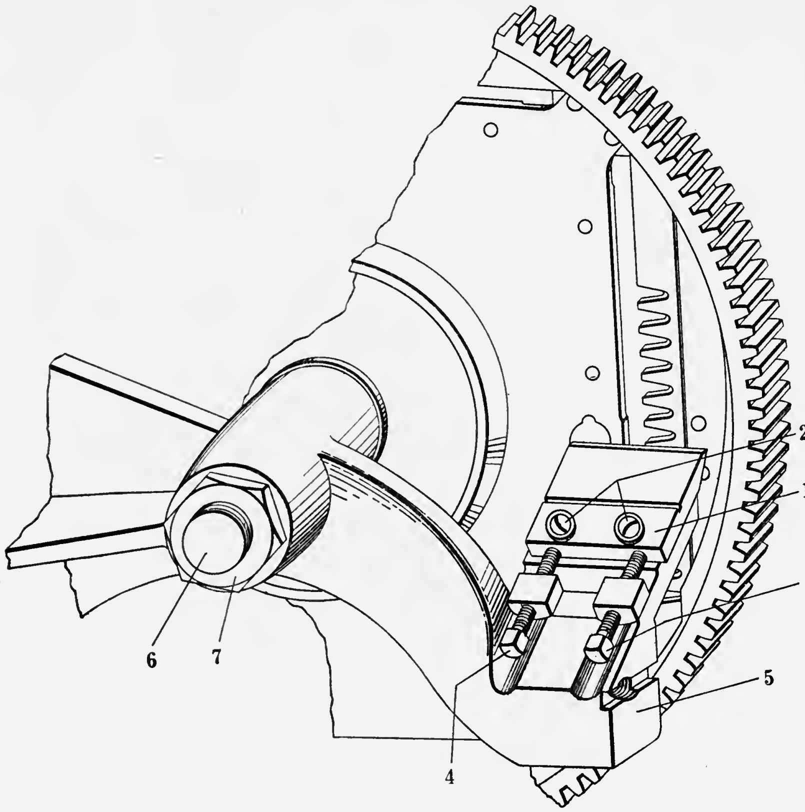


FIG. 57.—This is the Back Trimming Knife. It trims the base of the slug and shaves off the projections from the jets and vents which remain attached to the slug after the cast, so that the slug will be type high. *The knife must not be set up so close as to cut or gouge the backs of the molds and liners.* The knife *1* is clamped to the mold slide arm *5* by two screws *2*. The outside adjusting screw *3* regulates the amount of metal trimmed from the bottom ends of a thirty-em slug. The inside screw *4* regulates the amount trimmed from the central part of the slug base. In cleaning out squirts always keep the instrument used to remove metal away from the back knife so as not to nick or move it out of adjustment.

If it becomes necessary to remove the mold disk from its bearing in the mold slide arm, the nut *7* is unscrewed from the stud *6*. This permits removal of the disk and stud without taking the disk from the stud. The stud and nut have left-hand screw threads. When unscrewing the nut turn it the opposite direction from a nut having the usual, or right-hand, screw threads.

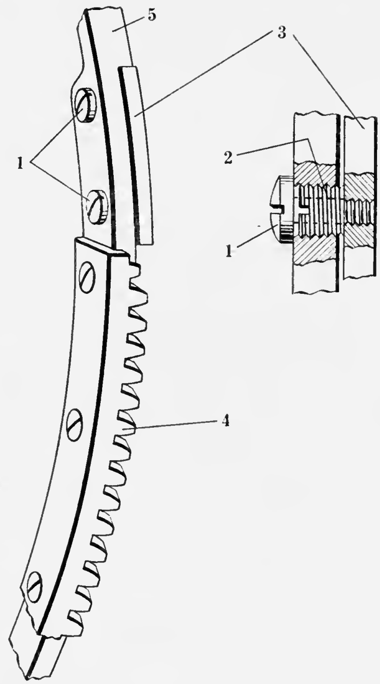


FIG. 58.—Section of the rim of the mold disk turning cam *5,* with one of the two segments *4* mounted upon it. The segments impart the turning motions of the mold disk. The shoe *3* is shown broken away so that the adjusting bushing *2* is visible. There are two of these screw bushings under each shoe on the rim of the mold disk turning cam. They engage the square block, and through gears and the mold driving shaft, hold the mold disk in such a position that the locking studs will freely enter the stud block bushings, *1* and *2,* Fig. 72. The screws *1* and *1,* Fig. 58, hold the shoe *3* snugly against the bushings *2,* which in turn are threaded into the rim of the cam *5.* These shoes *3* must be adjusted so there will be the smallest amount of play possible between them and the square block on the bevel pinion shaft when the mold disk is forward on the stud blocks.

and short segments fastened in different positions on the rim of the mold disk turning cam. The short segment or rack turns the mold disk one-quarter revolution, going from normal to casting position, and the long segment revolves the disk three-quarters of a revolution when going from casting to ejecting position. The square block mentioned above as being mounted upon the short jack shaft with the bevel pinion, positions the mold disk studs exactly opposite the stud blocks in the vise frame so that the disk when pushed forward by the mold slide cam to the stud blocks will be held rigidly in position for casting and ejecting the slug. The block has hardened and ground plates fastened on two of its faces, and while the segments are not in engagement with the bevel pinion, the rim of the cam fits closely to the block so that the mold disk studs are in position to slide into the stud blocks in the vise frame. The cam has depressions in its surface opposite the long and short segments so that the square block will be free to turn when either one of the segments is in engagement with the bevel pinion on the jack shaft.

Just behind each segment upon the cam is fastened a hardened and ground steel shoe. Each shoe is held in place by two screws passing through screw bushings, which are adjustable to position the shoe in or out from the cam edge to take up nearly all the play between the square block and the

shoe, so that as the mold disk is about to be pushed forward upon the locking stud blocks in the vise frame, the studs will align with the stud blocks. When these shoes are opposite the square block there should be just a trifle play (about .002") between the parts.

Recessed Mold Cap Ranges

Intertype mold standardization provides complete flexibility due to the absolute interchangeability of parts, and to the patented features of the recessed mold caps which permit the use of flat liners. The universal adjustable body and the .020" high cap accent body are adaptable to the interchangeable use of any mold cap (with exception of the low slug mold cap).

Mold liners from 5 to 12 points are used to produce slugs up to 36 points, according to the depth of recess in the caps.

All recessed and head-letter caps, as regularly made, will cast any em or half-em measure up to 30 ems. This is accomplished by shifting the mold cap to locate a rib in the cap over the end of the left-hand liner. The mold cap dowel is elliptical in shape and the right-hand liner has two dowel holes; setting the cap dowel in one of the two intersecting liner dowel holes makes it

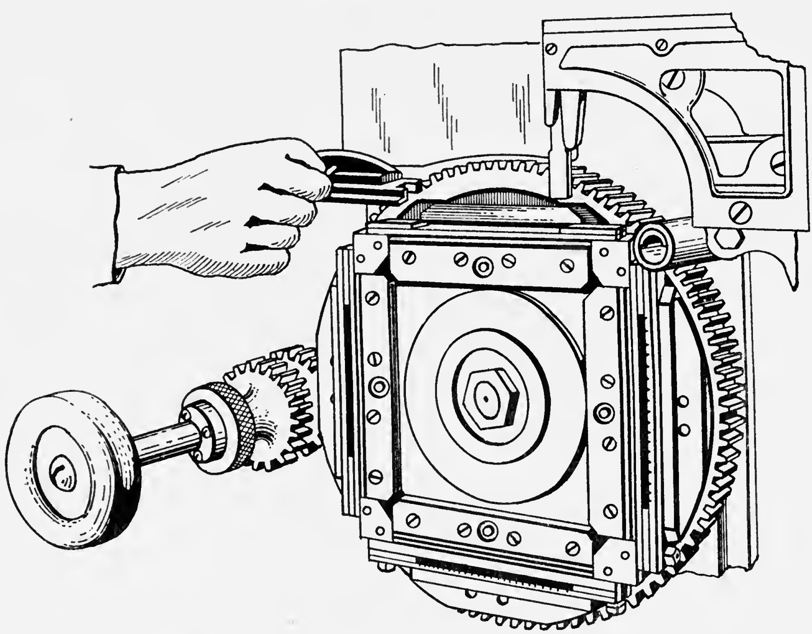


FIG. 59.—Lifting Off the Mold Cap. This illustration shows how the Intertype mold cap is removed when liners are being changed. The one making the change can see that no dirt or shavings are lodged between the liners and the mold cap or body.

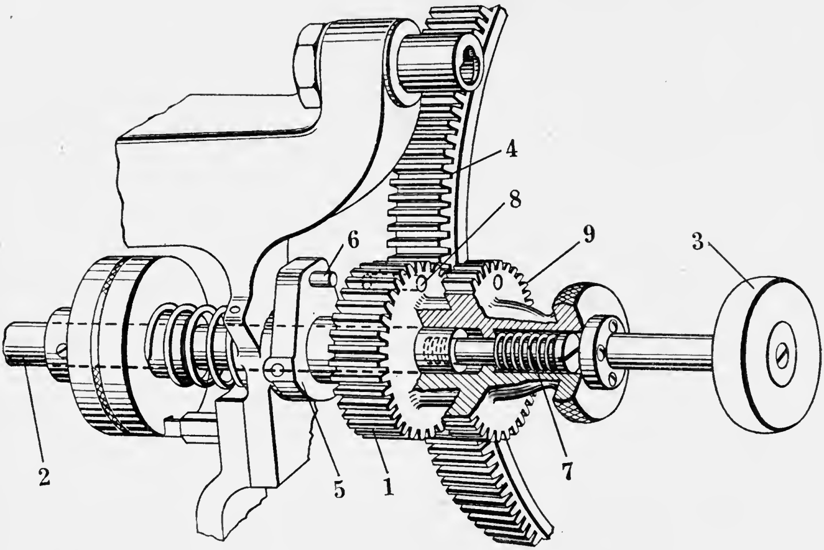


FIG. 60.—Changing the Mold. Showing how it is possible to disengage the mold driving pinion in order to change from one mold to another. This mold disk pinion is geared to the mold disk at a ratio of four to one. The mold disk is four times as large as the small driving pinion. When the mold disk is entirely disengaged from the small pinion, always return them to mesh so that the punch marks match. There is one punch mark on the edge of the small pinion face and four punch marks (one every quarter turn) on the edge of the mold disk. These two gears must always be properly timed by matching the punch marks, or the mold turning apparatus will throw the mold disk studs out of time with the stud blocks in the vise frame.

As explained previously, the pinion *1* is caused to turn the mold disk *4* by the shaft *2*. This shaft runs from the rear of the mold gear arm to the front of the machine and is operated by the long and short segments on the mold turning cam through the mold turning bevel pinion. Pinned to the shaft *2* at the front is a flange *5*, having in its front edge a pin *6*. This pin engages a hole in the back of the driving pinion *1* shown by the dotted lines at *8*. The pinion, normally, is caused to bear against the flange *5*, by a spring, indicated at *7*, working against the head of a screw which passes through the spring inside the pinion *1* and screws into the end of the driving shaft *2*. When the operator desires to make a change of mold by revolving the disk *4*, he grasps the extension knob *3* and pulls out the pinion *1*, disengaging the hole *8* from the pin *6* in the flange *5*. The mold disk is free to be turned as long as the knob *3* is held out and the pinion is disengaged from the pin *6*. Changing from one mold to the next adjacent mold will require one full turn of the pinion *1* and one-quarter turn of the disk *4*. After turning the knob *3* to make a mold change, the spring *7* pulls the pinion *1* back into engagement with pin *6*, providing the pin and the hole *8* register properly.

The pinion extension *9* is provided so that upon lowering the vise to first position the mold disk may be pulled out about two inches to make the pot mouthpiece accessible and at the same time the teeth of the mold disk *4* and the teeth of the driving pinion extension *9* will not become disengaged, so that no attention need be paid to retiming the pinion with the mold disk.

possible to properly match the end of any left-hand liner put on a mold body.

Recessed Cap A.—The different recessed mold caps are designated by letters, according to their body-casting ranges. For instance, the recessed cap A will cast slugs from 10 to 14 points in size. The cap is recessed 4 points. To find the proper liner size to use in order to get the body size, subtract 4 points from the point size of the slug. If it is desired to cast a 10-point slug, subtract 4 (the depth of the recess in the cap) from 10 (the size of the slug to be cast) which is 6, the point size of the liners to be used with recessed mold cap A to cast 10-point slugs.

Recessed Cap B is the next size mold cap, having a casting range from 12 to 18 points. The cap is recessed 6 points. If 12-point slugs are to be cast, subtract 6 (the depth of the cap recess) from 12 (the point size of the slug) which will give 6, the proper point size liners to cast a 12-point recessed slug from recessed cap B.

The first style first-elevator slide filling piece or the new style stop bar must be used with molds having recessed caps from the B cap for 18-point faces on up to 60-point caps.

Mold Cap F is not recessed, but has an extra thick lip and is used for hangover advertising figure composition, and only has a casting range from 5 to 12 points in body size. The G cap is similar to the F cap except that it is recessed.

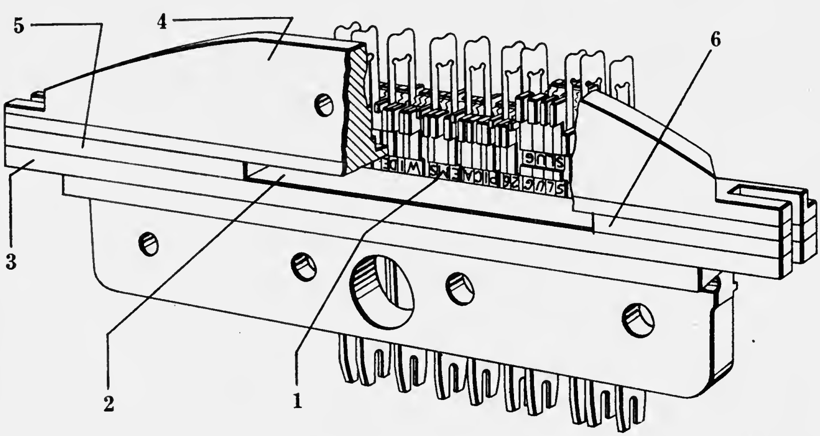


FIG. 61.—How a Slug is Formed. Here is a line of matrices fully justified and locked up tight against an Intertype mold.

The cap *4* of the mold has been broken away to show how the letters on the matrices *1* close up one side of the slot *2* formed by the mold body *3*, the mold cap *4* and the liners *5* and *6*, on the ends between the mold body and cap.

The matrices in the line have two positions. The raised matrices (in auxiliary position) will cast italic letters on the slug.

The slug is made by forcing molten metal into the slot *2*, filling the depressions of the letters in the matrices and forming, at the same time, the body portion of the slug.

The .020″ High Cap Accent Mold Body is used for composition in those languages which require accented capital letters. The aligning grooves in the mold face are set up several thousandths to make room for the accents. Of course, thicker liners are used to compensate for the amount the aligning grooves are elevated over the regulation mold body aligning grooves.

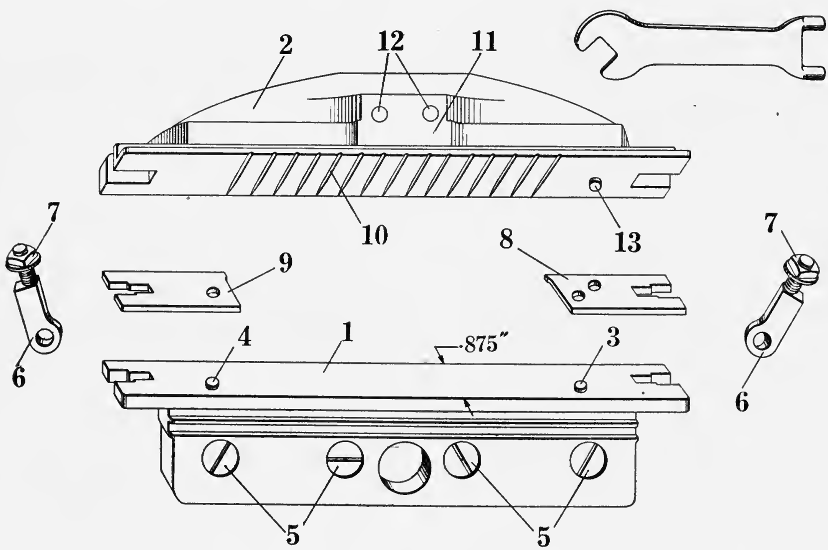


FIG. 62.—View of an Intertype Thirty-Em Universal Adjustable Mold. The body of the mold *1* is fastened to the mold disk by the four screws *5555*. The cap *2*, the right-hand liner *8* and the left-hand liner *9* are held to the mold body by the swivel bolts *6* and *6* by tightening the nuts *7* and *7* with a mold cap wrench at the top of the picture. The forked end of the wrench is inserted in the holes *12* of the cap to lift it from the mold. The right-hand liner *8* is always of the same length and is called the constant liner, being changed only when a thicker or thinner slug body is desired. The left-hand liner *9* can be changed for slugs of different length and thickness. The space between the ends of the liners *8* and *9* determines the length of slug to be cast. The dowel *3* in the mold body *1* accurately positions the liner *8* which has a hole in it that fits over the dowel. The dowel *4* locates the left-hand liner. The mold cap *2*, by means of the dowel *13* fitting in the hole in liner *8* is positioned accurately in relation to the body *1*. The mold cap *2* has grooves represented by *10* cut transversely in its under side. They are several thousandths in depth and terminate in a shallow point at the rear of the mold cap, tapering slightly throughout their length. These grooves form ribs upon the slug so that when the slug is being ejected through the trimming knives, it may be trimmed by the right-hand knife, shaving the ribs to accurate body size. The boss, indicated at *11* on the cap *2*, banks against a block mounted upon the right trimming knife as the mold comes forward for ejection. This boss *11* banking against the pad on the knife takes the thrust for the mold cap when the ejector blade pushes the slug from the mold.

Molds used in the United States measure .875″ across the body. In foreign countries the thickness varies according to the system employed (which corresponds to the point system used in America).

Description of Casting Ranges Possible with Intertype Standardized Recessed Molds

Below is given a practical illustration of the complete working ranges of the different recessed molds. It will be noted, however, that each of the six molds cover a different casting thickness range, as follows:

Recessed Mold U-341A will cast slugs from 10 to 14 points in thickness. To accomplish this, liners must be used, as follows:

Recess in cap U-329A, is 4 points
For 10-point slug use 6-point liners
For 11-point slug use 7-point liners
For 12-point slug use 8-point liners
For 13-point slug use 9-point liners
For 14-point slug use 10-point liners

Head-Letter Mold U-341B will cast slugs from 12 to 18 points in thickness. To accomplish this, liners must be used, as follows:

Recess in cap U-329B, is 6 points
For 12-point slug use 6-point liners
For 13-point slug use 7-point liners
For 14-point slug use 8-point liners
For 15-point slug use 9-point liners
For 16-point slug use 10-point liners
For 17-point slug use 11-point liners
For 18-point slug use 12-point liners

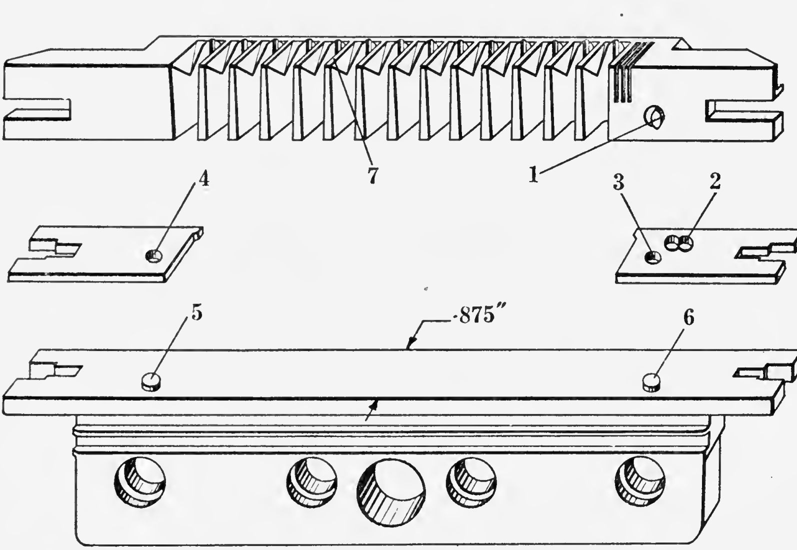


FIG. 63.—View of a Recessed Mold, demonstrating how any measure, including half ems, may be obtained by shifting the cap. The dowel *1* in the cap is partly cut away to an elliptical shape. The left-hand liner may be of any length and all lengths have a hole *4* which fit a common round dowel *5* in the body. The hole *3* locates the right-hand liner on a round dowel *6* in the body. The overlapped dowel holes *2* are used to locate the cap with the elliptical dowel *1,* by shifting the cap containing the pin *1* from one intersecting hole to the other in order to locate the ribs, one of which is shown at *7,* over the end of the right-hand liner.

Head-Letter Mold U-341C will cast slugs from 18 to 24 points in thickness. To accomplish this, liners must be used, as follows:

Recess in cap U-329C, is 12 points	For 21-point slug use 9-point liners
For 18-point slug use 6-point liners	For 22-point slug use 10-point liners
For 19-point slug use 7-point liners	For 23-point slug use 11-point liners
For 20-point slug use 8-point liners	For 24-point slug use 12-point liners

Head-Letter Mold U-341D will cast slugs from 24 to 30 points in thickness. To accomplish this, liners must be used, as follows:

Recess in cap U-329D, is 18 points	For 27-point slug use 9-point liners
For 24-point slug use 6-point liners	For 28-point slug use 10-point liners
For 25-point slug use 7-point liners	For 29-point slug use 11-point liners
For 26-point slug use 8-point liners	For 30-point slug use 12-point liners

Head-Letter Mold U-341E will cast slugs from 30 to 36 points in thickness. To accomplish this, liners must be used, as follows:

Recess in cap U-329E, is 24 points	For 33-point slug use 9-point liners
For 30-point slug use 6-point liners	For 34-point slug use 10-point liners
For 31-point slug use 7-point liners	For 35-point slug use 11-point liners
For 32-point slug use 8-point liners	For 36-point slug use 12-point liners

Recessed Advertising Figure Mold U-341G will cast slugs from 10 to 12 points in thickness. To accomplish this, liners must be used, as follows:

Recess in cap U-329G, is 4 points	For 11-point slug use 7-point liners
For 10-point slug use 6-point liners	For 12-point slug use 8-point liners

The matrix character may overhang 12 points on lip of mold cap.

Head-Letter Advertising Figure Mold U-341J will cast slugs from 12 to 18 points in thickness, the same as U-341B. The matrix character may overhang 18 points on lip of mold cap.

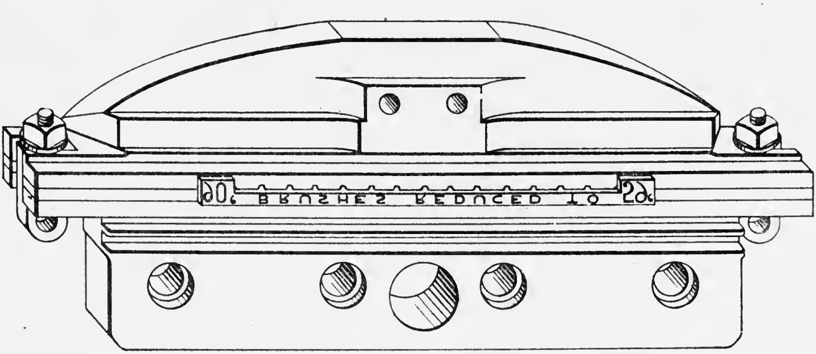


FIG. 64.—View of an Advertising Figure Mold. The lip of the mold cap is made extra thick, so that overhanging advertising figures can be cast on a slug body of smaller size. Part of the large advertising figure overhangs the slug which is supported in the type form by the slug immediately following. Slugs having overhanging advertising figures cast on the top edges are not trimmed by the side trimming knives.

Letter Symbols for Recessed Caps

A Recessed, 10 to 14 points.
B Recessed, 12 to 18 points.
C Head Letter, 18 to 24 points.
D Head Letter, 24 to 30 points.
E Head Letter, 30 to 36 points.
F Advertising Figure, 5 to 12 points.
G Advertising Figure, recessed, 10 to 12 points.
H Advertising Figure, 3-line 8-point.
I Advertising Figure, head letter, 3-line 12-point.
J Advertising Figure, head letter, 12 to 18 points.
K Head Letter, high cap accent, 36-point (.050″).
L Head Letter, high alignment, 40 to 46-point (.140″).

Comparisons with American Point System

Em	.166 2/3″
Cicero	.178″
Fournier	.16476″
Petit	.1115″
Point	.014″
Didot	.0148 1/3″
Point Fournier	.01373″

The Cicero is a unit of measurement used in Europe.
A point, American system, measures .014 inches.
An em, American system, measures .1666 inches.
A point, European system, measures .0148 1/3 inches.
An em, European system, measures .178 inches.
Therefore, a 30-em slug in America would be equivalent to a 28 Cicero.

Advertising Figure Mold Caps

Advertising figures are punched in regular (normal) position on the matrix. No special parts are necessary to use advertising figure matrices other than proper mold caps. Figures from 5 to 30-point will cast with the figure mold cap F. Figures above 30-point require a special mold cap. Mold caps can be furnished for three-line matter.

Intertype Border Slides

Border slides are strips of brass with rules or designs punched throughout their length. They are held in place before the mold by a matrix slide block. This block is shaped like a line of matrices, and slides into the first-elevator jaw in the same way. It has a slot for holding the slides, which are interchangeable, so that one block can be used for any number of slides, each slide bearing a different design.

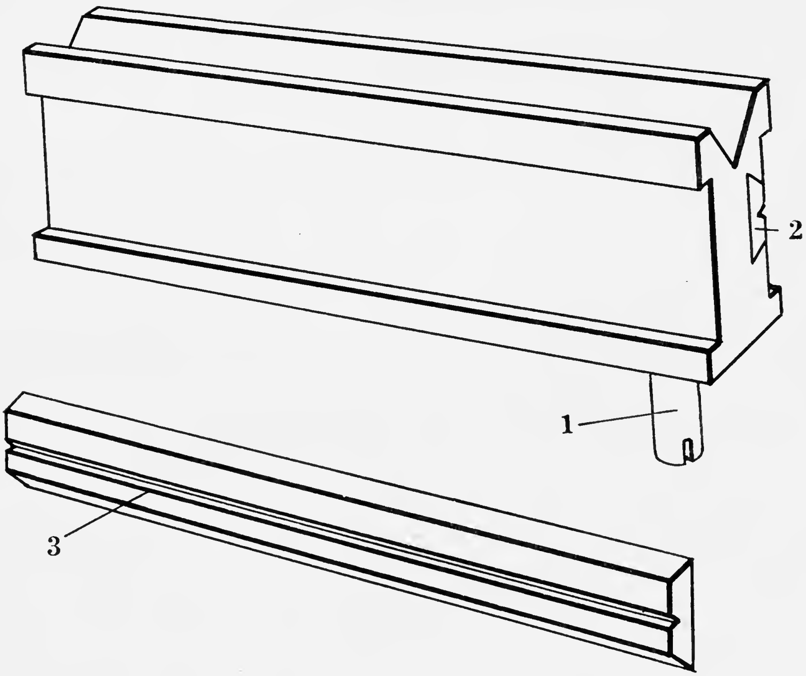


FIG. 65.—Matrix Slide Block in position as it appears when inserted in the first-elevator jaws for the purpose of casting rule or border slugs. Below the block is shown a matrix slide (in reverse position). This slide, containing the rule or border pattern, fits into the slot *2* of the block. The rule or border pattern is punched in the slide at *3*.

When casting from a matrix slide block, containing a border slide, set the vise jaws to the em length of the block and lock the spaceband transfer lever pawl. The projecting pin *1* in the block will render the pump stop inoperative and permit the plunger to cast. The length of the slug upon which the border is cast can equal or exceed the em length of the block. Slugs shorter in em length than the block must not be cast in connection with the block. Usually liners are changed in the mold so the slugs will be of the same length as the block.

Slides and slide blocks can be supplied in any length desired, up to and including forty-two ems.

All Intertype slides can be used in other slide blocks and other slides can be used in the Intertype blocks. The standard slide and slide block are thirty ems long. All rules cast on the constant or smooth side of the slug unless otherwise specified.

Intertype Border Matrices

One- and two-letter border matrices are exactly similar to ordinary one- and two-letter matrices, and are assembled in lines in the usual way. No extra equipment of any kind is required. By combining matrices carrying

different designs, an almost unlimited variety of borders can be produced. Border matrices always run pi but can have special combination teeth cut to run in the magazine. This, however, is rarely necessary and will be done only on special request of the customer.

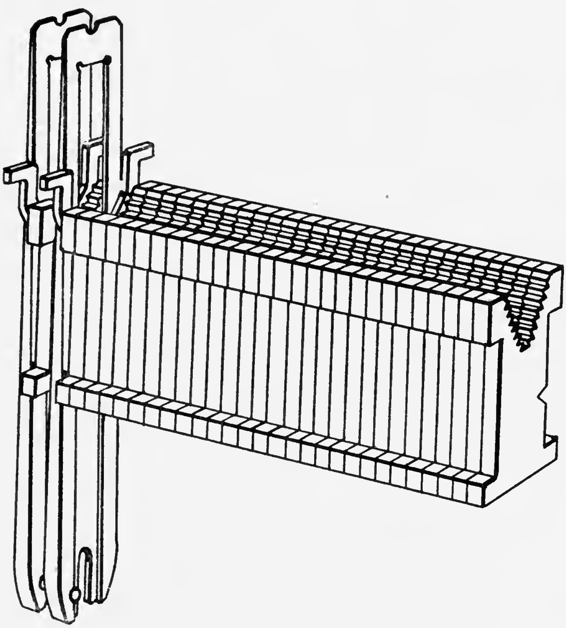


FIG. 66.—A Line of Border Matrices ready to insert in the first-elevator jaws, from which border material may be cast just like ordinary matrix lines. The spacebands will be driven up to justify the matrices in the regular way to render the pot pump stop inoperative.

On a 30-em machine, where the border pattern must cover the entire face of a 30-em slug, a stop pin can be inserted in a hole in the first vise justification rod under and at the right of the lower vise frame bridge. This will cause the pot pump stop to be inoperative.

Wherever possible, it is recommended that one or two spacebands be inserted at the left of the border matrices so that regular spaceband justification of the matrices can take place. The line should be spaced loose enough to permit the justification bar to drive the spacebands up about half way.

Mold Cooling Equipment

The Intertype Corporation regularly furnishes a mold cooling equipment with 42-em machines. It can be applied to any 30-em machine using head-letter or display composition.

It consists principally of a small rotary air pump mounted on the motor bracket at the rear of the keyboard. The outlet pipe or nozzle 7, Fig. 67, is

placed above the right-hand vise locking stud, and the air stream is directed downwardly upon the mold cap and face of the mold.

In Fig. 67 is shown a perspective view of the mold cooling device. The rotary air pump *1* is driven by the regular machine motor *9*. The power is applied from the intermediate driving belt and the intermediate shaft. Upon the intermediate shaft is mounted the rotary pump driving pulley *8*, and from there the power is applied by a small flat belt running to a pulley on the shaft of the pump contained within the pump body *1*. Positioned inside the machine column is an oil separator cylinder *5* which connects the air inlet pipe *3* and the outlet pipe *4*. This cylinder or trap is partially filled with steel wool *2* which catches any oil coming through the inlet pipe *3* so as to prevent it from contaminating the mold and fouling matrices. A hole, *6*, in the bottom of the cylinder permits any excess oil to escape that might come through from the pump lubricating cup.

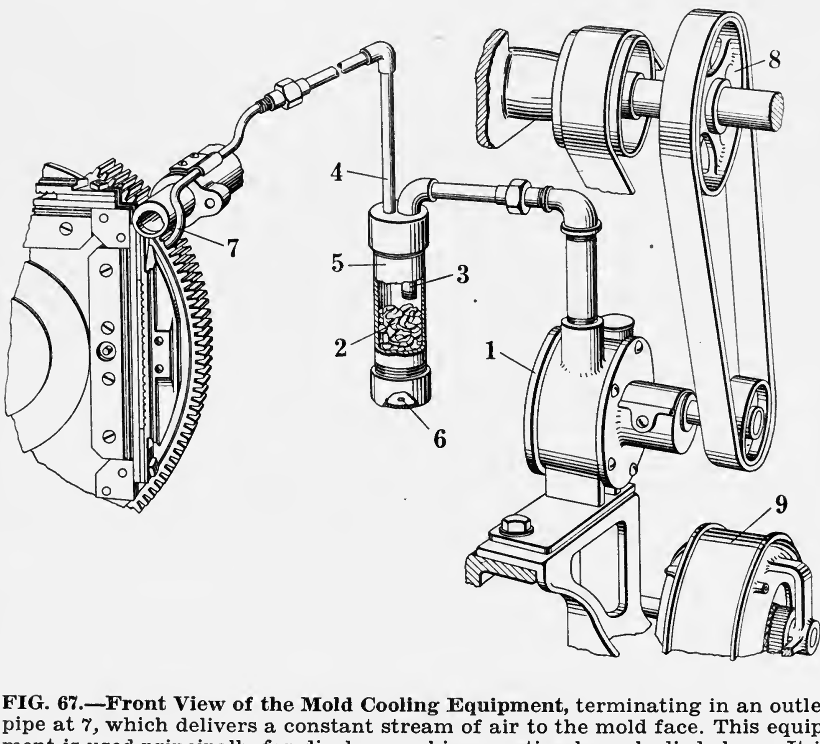


FIG. 67.—Front View of the Mold Cooling Equipment, terminating in an outlet pipe at 7, which delivers a constant stream of air to the mold face. This equipment is used principally for display machines casting large-bodied slugs. It is also applied to the forty-two-em Intertype.

The device is driven by the machine motor. A pulley, *8* on the intermediate shaft, drives the pump through a small, flat belt.

Operation of the Pump is as follows: The central hub *2*, Fig. 68 is mounted within the pump body *1* in an off-center position. The blades *3* and *4* (which two are merely used for purpose of illustration) are hinged to the hub *2* and are free to move in the direction of rotation a slight amount. The sides of the blades exactly fit the side plates of the pump body *1*. As the hub *2* revolves clockwise, the blades are caused to bear by centrifugal force against the rim of the body. In the drawing, the blade *4* is about to pass over the opening of the inlet pipe *5*, which action of the blade carries with it a quantity of air in the pocket just ahead of the blade. Owing to the eccentric position of the hub *2* in relation to the inner rim of the pump body *1*, blade *4* is caused to close in nearer to blade *8*, which compresses the air contained within the pocket between the blades. As the blade *4* nears the outlet pipe *6*, identical with the position of blade *3*, the air is expelled under pressure through the outlet pipe *6* to the oil separating cylinder, and from there through the mold cooling pipe. As the blades pass the outlet they are free to straighten, owing to the position of the shaft or hub *2* in relation to the inside wall of the pump body *1*.

Maintenance of the Mold Cooling Equipment.—Once or twice a week apply a small amount of oil to the cup *7*, which intersects the intake pipe near the pump body.

Every six months, or oftener if necessary, remove the oil separator cylinder in order to cleanse the steel wool with gasoline, as well as the intake and outlet pipes. The cylinder is suspended by brass unions between the two pipes inside the machine column.

It is advisable that the mold cooling tube, running from the brass union in the machine column to the mold, be changed from the first to the new style, in case the pump has the first style mold cooling tube. The new style tube has an inside diameter equal to that of ⅛″ gas pipe. The larger outlet tube or nozzle reduces air friction and permits the pump to operate more efficiently.

Returning Molds to the Disk

To replace a mold in its seat upon the disk, first wipe the mold clean with a wiping cloth, place the body in position and bring the four body screws up tight, then back them off one-quarter turn; place the liners and cap upon the body and tighten the cap swivel bolts; the body screws may now be brought up tightly. In this way the mold will fit down upon its seat properly in the disk. If a mold is tightened to the disk in an improper manner, the trimming knives will appear to have slipped out of position.

Daily Care of Molds

Make it a part of daily routine to scrape the mold faces and vise jaws with a piece of brass rule, which can usually be found in any composing room. If metal collects upon the mold faces, matrices will be held away from the mold and the slugs will be more than type high (.918″). The collected metal, which

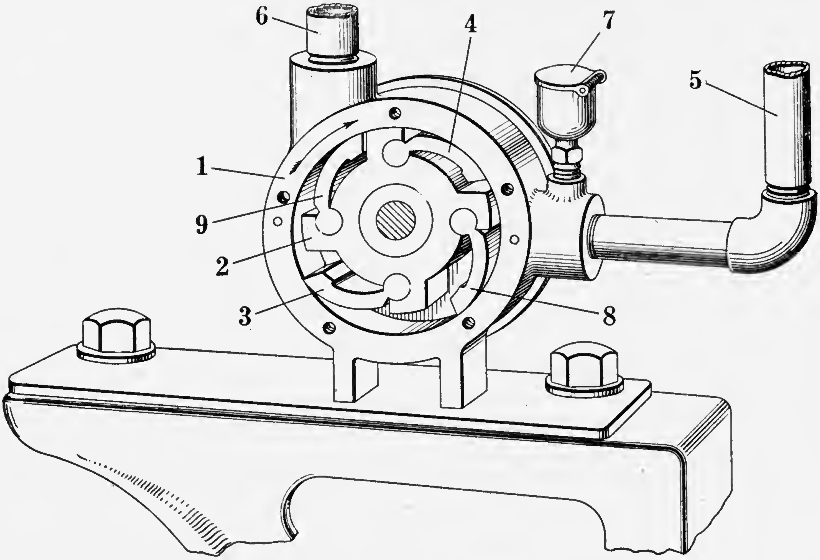


FIG. 68.—Interior View of the Mold Cooling Equipment Pump Body, *1,* showing the arrangement of the compressor blades *3, 4, 8* and *9.* These blades while revolving compress the air and force it through the outlet pipe *6,* from which point it passes into a trap or oil separator cylinder mounted within the machine column and out again until it reaches a nozzle mounted on the frame of the machine above and to the right of the mold disk. The nozzle is positioned in such a way that as the air is expelled, it is directed lengthwise over the face of the mold body and the mold cap.

is more or less uneven, will have a bad effect upon the matrices. Hold the brass rule at right angles to the surfaces being scraped and do not hold it in such a way that the vise jaw corners will be rounded. After scraping, rub a little dry graphite over the mold faces and the vise jaws, and give some attention to the first-elevator jaws. Avoid letting any graphite fall upon the justification block. This will have a tendency to cause spacebands to slip on the block during justification and bend the long wedges. Just keep the top surface of the block clean.

Polishing Molds

Mold interiors should be polished occasionally, but not frequently. Upon the condition of the metal used in casting slugs will depend the frequency with which molds will need this attention. Metal kept in proper alloy will materially reduce mold cleaning and polishing. A mold interior coated with lead oxide is conducive to stuck slugs, that is, slugs that stick in the mold when the ejector blade strikes the foot of the slug. The use of graphite and a pine stick as a polish to remove the oxide coating from the interior of the

mold is not recommended. As a temporary makeshift it is all right. Graphite is not an abrasive agent, and the best effect it can have is to supply a temporary coating which will permit slugs to eject easily, until time can be had to polish the mold thoroughly.

There are only a few polishing agents that are suitable for the work of removing the black oxide coating from the casting surfaces of molds. The polish used must not contain any free grit which will cut or scratch the interior surface of the mold. Crocus powder or tripoli mixed with oil, or Dixon's mold polish (the latter may be obtained from the Intertype Corporation) are harmless polishes. In applying the polish and rubbing the mold, use a flat pine stick and move it with circular strokes while holding flat with the part of the mold being polished. Tipping the stick will have a tendency to round the corners, and fins will appear on the slug when this condition is present.

It is not necessary to remove the mold body from its pocket in the disk. Give some attention to the ribs in the cap, using the stick which may be pointed to fit the ribs. At this time clean the ends of both liners.

A recessed mold cap will require more effort to remove the oxide coating. After using the polish wipe the parts clean and dry with a cloth.

Warped Molds

Intertype molds are manufactured with great care and precision, but it is impossible to make them in such a way as to withstand the excessive heat generated by a hand gas torch, or excessive metal temperature.

It would seem that molds should be accorded the care and attention that fine workmanship and material deserve.

Molds Can Be Warped Through Careless Handling of the Machine. A warped mold is one in which either the body or cap have been thrown out of true line by the sudden application of excessive heat. Sometimes the cap alone will warp while the body will remain straight. A warped mold makes adjustment of the back trimming knife a difficult matter. The knife can only be set as close to the mold as the warped part will permit. Naturally, the mouthpiece will not always fit the shape of the back of a mold in this condition and fins will appear at the foot of the slug which cannot be trimmed by the back knife. In most cases the slug will be above .918″ high. When the back side of the cap alone is out of line with the body, a fin will appear along the rib side of the foot. It is also possible to warp a cap so that the body of the slug will be gouged by the right side-trimming knife; a fin of metal may also appear at the end of the slug (rib side) because there is an open space between the mold cap and left-hand liner.

Molds can be thrown out of true when a frozen mouthpiece is thawed with a hand gas torch and the one doing the job neglects to pull the mold slide out and away from the metal pot, so that heat from the gas flame is applied to the mold and disk. Casting slugs with metal at too high a temperature has something to do with the matter. Keep the thermostat properly adjusted to

control the temperature—between 525 degrees and 550 degrees is about right. Do not screw up the nuts on the mold cap bolts too tight. Remove burrs from the liners and do not permit little metal bits to lodge between the liners and mold body or cap.

Never leave the machine standing with the pot mouthpiece locked against the mold.

To determine whether a mold body or cap is warped, remove from the machine, and while holding up to the light, place a straight edge against the part you have reason to believe is out of order.

If it is necessary to have a mold repaired, send it to the nearest Intertype Agency.

Front Mold Wiper

The front mold wiper bracket is mounted on the right-hand mold disk locking stud block. The wiper *4*, Fig. 70, is caused to wipe the mold faces by a spring *5* as the mold disk revolves. There is a leather piece at the top of the wiping felts to prevent the felts from curling upward. If new felts are needed at any time, soak them in gasoline after application to the bracket and rub in some dry graphite. Never use oil or grease on the front mold wiper. Pass a cord through the loop of the spring *5* when returning to its place over the hook on the bracket. This makes engagement of the spring with the bracket hook an easy matter.

The Forty-Two-Em Front Mold Wiper consists of a round felt attached to a flat disk. The felt has flat contact with the mold face and is free to revolve upon its spindle. The spindle passes through the vise cap to the front of the machine where a cotter pin limits the contact of the felt with the mold. Taking out the cotter pin permits the wiper to be removed from the machine. A spring under the head urges the wiper felt against the mold. Like the thirty-em wiper, never use oil or grease on the felt, but saturate with gasoline and rub in dry graphite. The wiper felt disk is similar to the felt used in the back mold wiper.

The Back Mold Wiper

The first style back mold wiper is positioned in the mold slide stud arm under the back trimming knife. It is accessible for removal by taking a mold from the disk. Ordinarily the felt can be cleaned and lubricant applied by removing a mold cap and the liners, which will expose most of the wiping surface, *1* Fig. 69a.

The New Style Back Mold Wiper is shown in Fig. 69b. The cup containing the wiping felt is positioned under the mold disk stud back of the disk. The wiping felts can be inspected by removing the two screws holding the cup to the spring bracket. The felts are wound spirally, edge up and extend outwardly from the cup.

Give the Wiper Attention Once a Week.—Common machine oil and graphite, or stick mold lubricant, which is obtainable from the Intertype Cor-

poration, can be rubbed into the felt after scraping off any smooth or caked substances. Roughen the felt and apply fresh lubricant. This treatment will keep the backs of the molds polished and prevent any metal accumulations so that a workable contact of the mouthpiece with the molds will be maintained. However, as mentioned in other pages of this book, carefully avoid applying an excess of the lubricant, because, as the molds heat from casting, the oil or grease will be thinned and flow to the front of the mold and contaminate the matrices. Like the assembler and distributor bearings, the back mold wiper can be the source of an untold amount of trouble by fouling matrices which will cause them to stick in the magazine.

A little judgment in the amount of lubricant applied to the back mold wiper felt, the assembler and distributor bearings, will prevent the necessity for cleaning magazines and matrices out of turn.

In Fig. 70, *1*, *2* and *3* represent the mold banking blocks, by which the mold is supported when the ejector blade strikes the base of the slug. The most important of the three is the lower block *1*, fastened to and forming a part of the knife wiper guide. This block, naturally, has more work to perform because the greatest amount of composition done on the average ma-

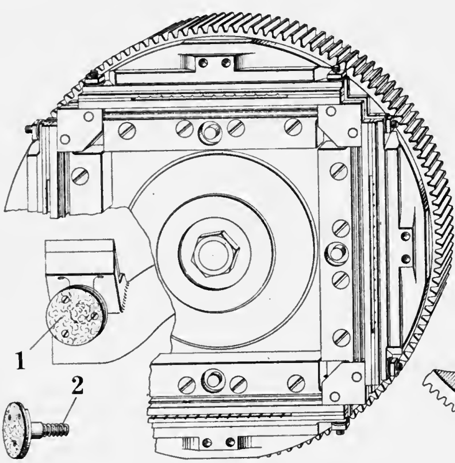


Fig. 69a

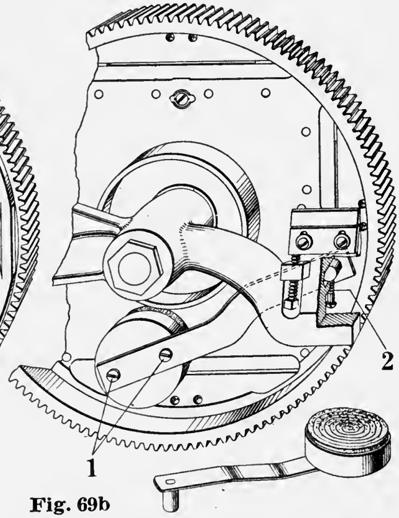


Fig. 69b

FIG. 69a.—View of the First Style Back Mold Wiper. The wiper felt *1* is fastened to a disk. The shank of the disk fits into a hole in the mold slide arm under the back trimming knife. The spring *2* urges the wiping felt against the backs of the molds.

FIG. 69b.—View of the New Style Back Mold Wiper. The wiper is positioned under the disk bearing, and the cup containing the wiper felts is supported by a leaf spring bracket extending downward and to the right from the mold slide arm. A screw *2* under the back knife, holds the wiper bracket in place. The wiper cup can be removed after taking out the two screws *1*.

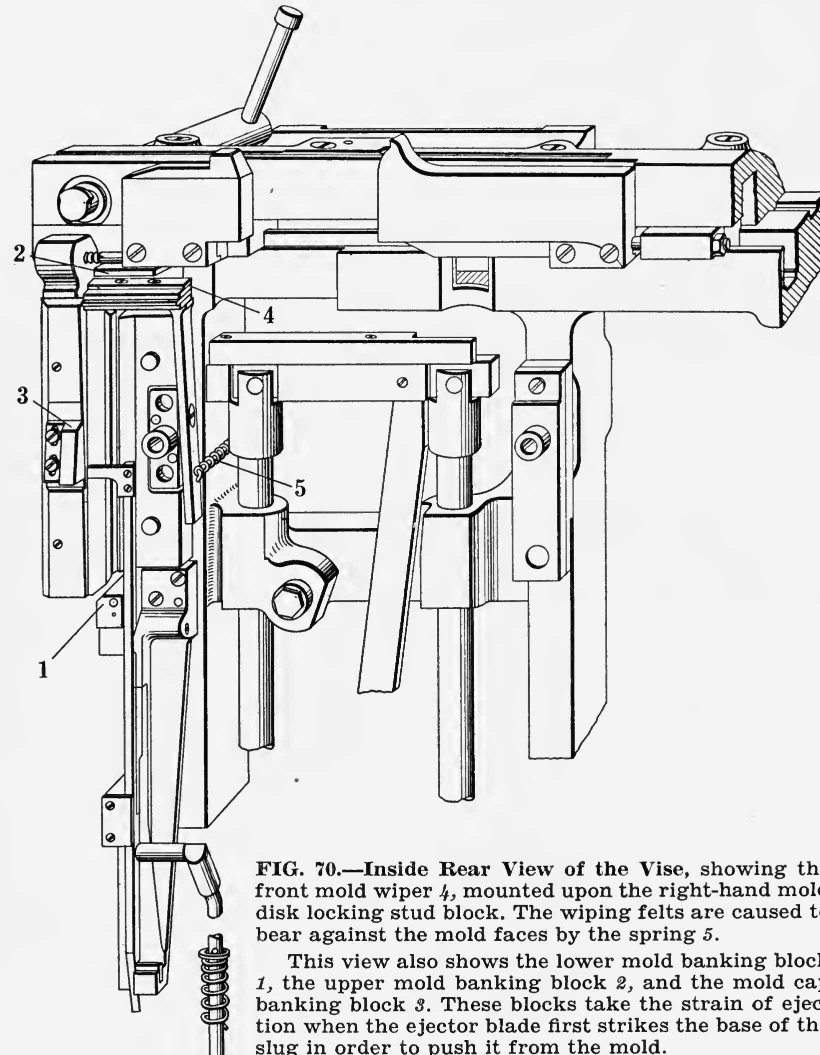


FIG. 70.—Inside Rear View of the Vise, showing the front mold wiper *4*, mounted upon the right-hand mold disk locking stud block. The wiping felts are caused to bear against the mold faces by the spring *5*.

This view also shows the lower mold banking block *1*, the upper mold banking block *2*, and the mold cap banking block *3*. These blocks take the strain of ejection when the ejector blade first strikes the base of the slug in order to push it from the mold.

chine is of short measure slugs. There are no adjustments for the lower block *1* and the upper block *2* mounted on the vise frame above the trimming knives. These two blocks support the mold body, liners and extreme ends of the cap. The third block *3* is fastened to the right-hand trimming knife and is held in place by two screws. There is a corresponding boss or pad on Intertype mold caps *11*, Fig. 62, which bank against the block *3* on the right-hand knife. The block is adjustable through its wedge shape where it has contact

with the knife. This adjustment will need checking over when making a change in trimming knives. A test for its adjustment is made as follows: Shut off the controlling lever, pass a long strip of paper in front of the banking block, through the knife block dial; back the machine until the mold has advanced upon the locking stud block. In this position the strip of newspaper, when pulled out, should just drag without tearing.

Cleaning Out a Back Squirt

The Intertype Corporation is cognizant of the fact that, through negligence, carelessness or misadjustment of the casting apparatus, it is possible to have squirts on machines of its manufacture. It is our intention to present information in this book so that squirts may be prevented, but in the event they do occur, correct information may be had so as to properly take away the surplus metal and preserve the parts—especially the avoidance of damage to molds.

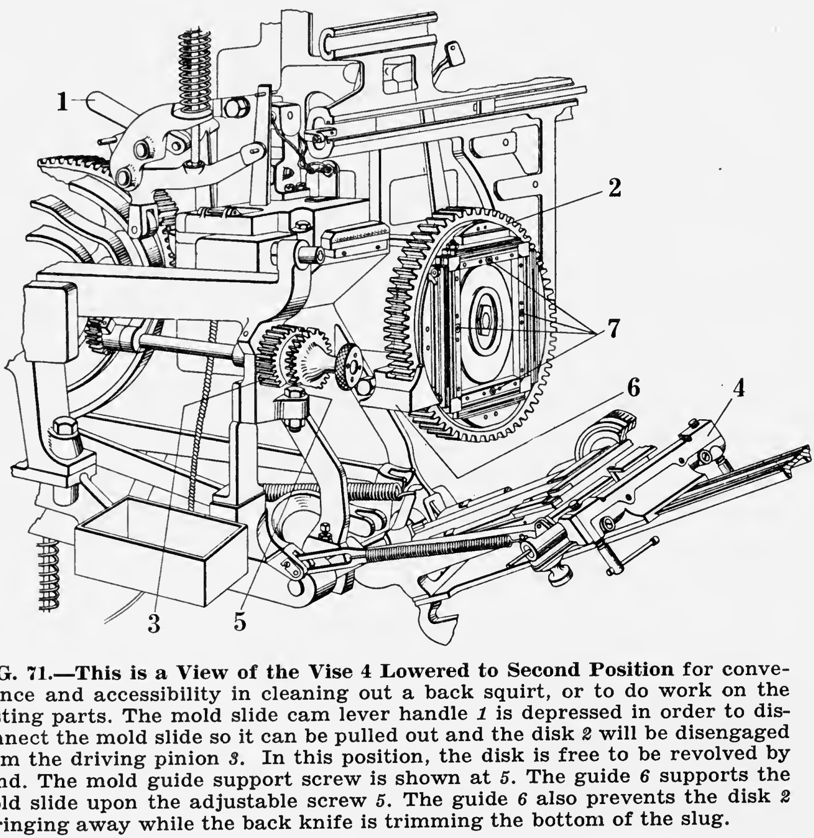


FIG. 71.—This is a View of the Vise 4 Lowered to Second Position for convenience and accessibility in cleaning out a back squirt, or to do work on the casting parts. The mold slide cam lever handle *1* is depressed in order to disconnect the mold slide so it can be pulled out and the disk *2* will be disengaged from the driving pinion *3*. In this position, the disk is free to be revolved by hand. The mold guide support screw is shown at *5*. The guide *6* supports the mold slide upon the adjustable screw *5*. The guide *6* also prevents the disk *2* springing away while the back knife is trimming the bottom of the slug.

In cleaning out what is known as a back squirt, always be careful to remove the type metal in such a way as to avoid damaging molds.

Back squirts, theoretically, are never supposed to occur. The reason for their occurrence, such as high metal temperature, misadjustment of the pot lever, uneven mouthpiece lockup in relation to the mold, foul plunger, and so on, are fully described in the section about metal pots.

Usually a back squirt is detected immediately after the cast. If the machine stalls, shut off the controlling lever as soon as detected. The vise can be opened and let down to second position, Fig. 71, and the mold slide pulled out to make the squirt accessible.

Often a back squirt can be cleaned out by merely opening the vise to first position, disconnecting the mold slide from its cam lever by the handle in the pot pump lever bracket, after which the mold slide can be pulled out from its normal position about two inches. This will be sufficient opening to make the ordinary back squirt accessible. There is no danger in getting the mold disk and its turning pinion out of time, because the extension teeth on the small driving pinion remain in mesh with the disk teeth when the disk is pulled out.

If it is necessary to let the vise down to second position, turn the machine until the first elevator rests on the vise cap. If the machine cannot be turned by hand with the friction clutch arm, pull out on the knob to disconnect the pinion *3*, Fig. 71, from the mold disk *2*, and slightly turn the knob until the pin in the mold turning flange is disengaged from the pinion *3;* then turn the machine by hand with the friction clutch arm until the first elevator rests upon the vise cap. The object in having the first elevator rest on the vise cap is to make clearance for the first-elevator lever roller at the lowest point of the cam, so the connecting rod will not be broken by the weight of the vise. Open the vise and pull out the vise frame rest knob in the machine base until the vise frame rest lug has cleared the stud, then let go of the stud and lower the vise frame rest lug upon the stud.

The mold cap may be removed by loosening the two swivel bolt nuts at either end of the mold and lifting the cap from the body with the forked wrench supplied for the purpose. Lay the cap down carefully to avoid rounding or nicking the edges.

Use a long piece of brass to remove the metal from the parts and *keep it away from the mold.* If a steel screwdriver must be used, see that it is blunt and has a rounded end. Carefully avoid gouging or digging it into any part of the machine.

Wipe all the mold and mouthpiece parts with a dry wiper cloth.

Sometimes a piece of metal will adhere to the disk in such a way as to block the wheel by wedging between the scraper back of the disk and the front lower end of the mold slide casting. If metal accumulates on or around the back knife, carefully pry it loose without disturbing or injuring the back knife.

Having wiped the parts clean, return the liners and cap to the mold body, and have the mold which is being used at the time in position at the top of the disk; push the disk back in place so that the timing marks on the pinion and disk register with each other; raise the mold slide lever in the plunger bracket and close the vise.

Mold Disk Locking Studs and Stud Blocks

The mold disk has four studs on its front surface, two of which register with stud blocks or sockets in the vise frame. This device is used so that each time the disk is advanced, to casting or ejecting position, the mold in use will align with the matrix line and the trimming knives. The right-hand stud block is fixed as to position, and is immovable (*1*, Fig. 72). The left-hand stud block is slightly movable sidewise, and is also called the floating stud block *2*. The purpose in having it slightly movable is to take care of the expansion and contraction of the disk. After being used, the disk heats, and the space between any two studs is wider than when the disk is cold. In changing from one mold to another, there is liable to be a variation in the distance between the two studs, due to the heat. The left-hand stud consists of two plates, pivoted at the bottom by a cone and screw, and the back plate *6*, is free to move slightly at its upper end within the limits permitted by a shoulder screw passing through the top plate. The stud bushing is mounted near the top of the back plate.

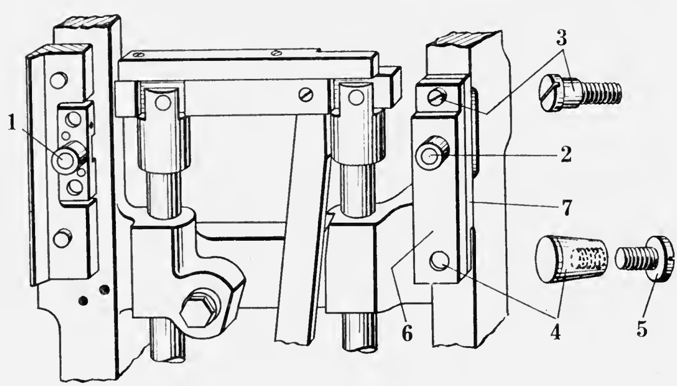


FIG. 72.—Vise Mold Disk Locking Stud Blocks. (Rear inside view.) Showing the right and left-hand mold disk locking stud blocks which hold the mold disk rigidly in place while a matrix line is being justified previous to the casting of a slug, and during ejection of the slug through the trimming knives. The right-hand block *1* is fixed as to position. The left-hand block *2* is slightly movable and is called the floating stud block. The two plates are hinged at the bottom by the cone or hinge block *4* and the screw *5*. The top of the back plate *6* is slightly movable sidewise and its movement is limited by the shoulder screw *3*. The front plate *7* is doweled to the vise frame and is immovable.

For the reason that a loose first style mold driving shaft friction clamp may cause the mold disk to pound the cone and screw loose in the left-hand floating stud block, an effect will be given which will make it appear that the first-elevator banking screw is out of adjustment and will cause too much play between the banking screw and vise cap when the first elevator rises for matrix alignment with the mold.

The same effect will be obtained if there is a movement of the mold disk when the studs are in engagement with both the right- and left-hand stud blocks. This play, too, will make it appear that the side trimming knives are out of adjustment, because, when the mold is presented before the trimming knives, it may assume a slightly different position each time, with the result that slugs will be trimmed with great variation. The only remedy in a case like this is replacement of the stud blocks and studs.

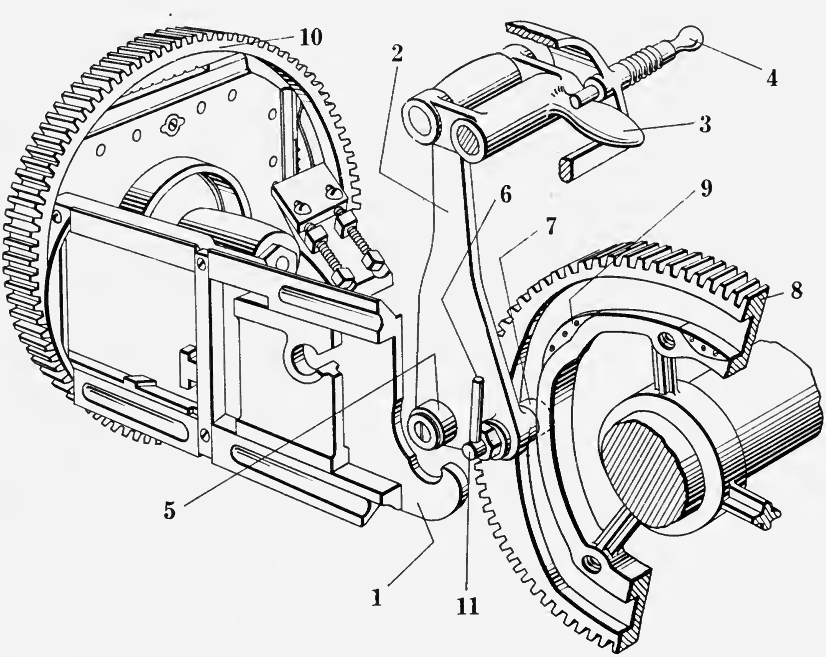


FIG. 73.—Disconnecting the Mold Slide. View showing how the mold slide *1* is disconnected from the mold cam lever *2*, so the slide may be withdrawn for cleaning or repair purposes. The handle *3* is depressed and the handle pin *4* withdrawn. After the handle *3* is depressed the pin *4* holds the lever *2* up so that roller *5* will not be in engagement with the hook in the casting of the mold slide *1*. The mold slide cam *8* controls the forward and back strokes of slide *1* and disk *10*, through the mold cam lever *2* connected by rollers *5* and *7*. The distance the mold disk *10* can go forward against the vise jaws is controlled by the eccentric pin *11*. The jam nut on the pin is loosened and the handle *6* shifted until the mold face is brought within .010″ of the vise jaws, when the roller *7* is in contact with the first shoe *9* in cam *8*.

To test the condition of the mold disk locking studs and blocks, let the machine go around until the disk studs are in engagement with the stud blocks when the mold disk is in forward position and shut off the controlling lever. With a large screwdriver *gently* pry upwards against the teeth of the mold disk one side at a time, and note whether the disk has a slight upward movement. Inspection of the bushing holes in the stud blocks will also show if the holes have been worn to an elliptical shape. Often, merely tightening the cone or hinge block will eliminate any lost motion in the hinge at the lower end of the block.

Forward Thrust of the Mold Slide

The mold slide is adjusted with the eccentric pin in the mold cam lever until the mold face comes within .010″ of the vise jaws. After the adjustment has been made, a very small movement of the disk should be noticeable when the metal pot presses against the back of the mold. This condition of the adjustment is to insure freedom of spaceband justification each time the justification block rises against the spacebands. If this freedom is not present, spacebands will not expand properly and a squirt may occur, or spacebands may be bent.

Adjusting Forward Thrust of Mold Slide.—In order to make this adjustment, remove the first-elevator back jaw and the line stop, disconnect the pot pump plunger pin, close the left-hand vise jaw against the right-hand jaw, and run the machine ahead until the first elevator rests upon the vise cap. Place three long strips of paper one inch wide (measuring .010″ thick) between the vise jaw and face of the mold; turn the machine ahead until the roller 7 in the mold cam lever *2*, Fig. 73, contacts with the hardened steel shoe *9* in the mold slide cam crease at the point where the cam *8*, through the lever *2*, causes the mold disk *10* to advance upon the matrix line. With the mold disk forward in this position, the paper strips should drag slightly when pulled upward from between the vise jaw and mold. The eccentric pin *11* is held tightly in place by a jam nut which must first be loosened to release the pin. There is a small handle *6* attached, by means of which the pin *11* can be turned to move the mold the proper distance against the vise jaw. Pushing the handle *6* towards the front of the machine shortens the forward stroke of the mold against the vise jaws; likewise, pulling the pin *6* towards the back of the machine will cause the mold to come closer to the vise jaws. Always make this adjustment with the mold cam shoe *9* opposite the cam lever roller 7. The shoe surface is slightly higher than the balance of the cam crease. The same may be said of the shoe which is placed at a position in this same cam which takes the thrust when the cam pushes the mold disk forward to ejecting position. After completing the adjustment, look to see if the mold disk has a slight forward movement when the pot mouthpiece locks against the mold.

Supporting Screw Adjustment

The mold slide support screw which provides a bearing for the left side of the mold slide, like many other adjustments on the machine, should be let strictly alone after once being set. It only requires setting at very infrequent intervals. Do not blame the mold slide support adjusting screw *5*, Fig. 71, when the disk studs *7* fail to register properly with the stud blocks *1* and *2*, Fig. 72. A binding disk due to a dry mold disk stud, or to metal having collected behind the disk may cause trouble. A loose mold driving shaft clamp, first style, Fig. 74, will also permit the disk to chatter if too loose, or fail to come smoothly on the vise frame stud blocks if clamped too tightly.

Ordinarily it is sufficient to say that when the mold disk studs are in advanced position upon the vise frame stud blocks, that this screw under the guide block should just touch the under side of the guide block. Raising the screw slightly raises the position of the mold disk studs in relation to the stud blocks in the vise frame, *but,* adjusting the screw also tilts the mold slide arm back of the disk which will affect the parallelism of the ejector blade

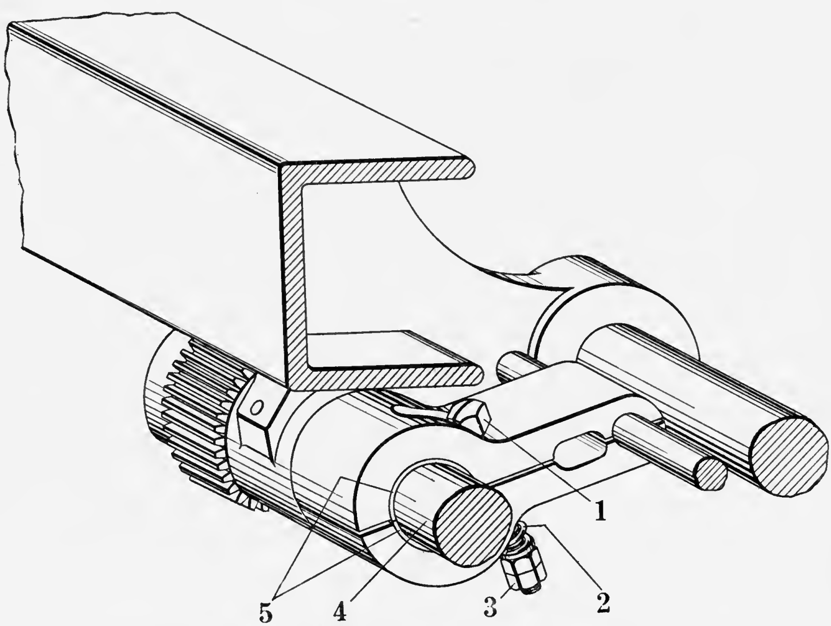


FIG. 74.—First Style Mold Driving Shaft Friction Clamp. The mold driving shaft is indicated at *4;* the shaft is clamped by the leather linings *5* and *5* held within the upper and lower clamp plates under pressure of the spring *2*. The screw *1* has on its lower end two nuts *3* which are adjusted to secure more or less tension on the spring *2* so that the leather clamp linings will grip the shaft *4* enough to steady the mold disk and prevent its overthrowing when coming to a stop.

with the constant side of the mold. The ejector blade is housed in the mold slide and must never rub the mold body (smooth side of the casting cell) as it will cut or score it. This adjustment is made with *unworn* mold disk locking studs and stud blocks. In order to determine the correctness of the mold slide support adjusting screw, first remove the mold cap and liners; turn the mold body to ejecting position (vertical), set the vise jaws to thirty ems, set the ejector blade for thirty ems, remove the knife block by loosening the two cap screws that hold it to the vise frame, taking out the two half-washers under the screw heads and slipping the knife block from the screws. Do not take out the two knife block screws which hold the block to the vise frame. Close the vise and back the machine until the mold disk has advanced onto the locking stud blocks. Push the thirty-em ejector blade forward by the lever at the rear of the machine until the blade covers about half the mold body. With the machine in this position, the mold slide support screw should be adjusted until the ejector blade does not touch the constant side of the mold body at any point. In any event, do not jam or force the adjusting screw tightly against the under side of the guide, which condition would rapidly wear out the parts.

It is repeated here that this adjustment will rarely need to be made. If you have reason to believe that it is out of order, first look to the condition of the studs and stud blocks. Especially note whether the left-hand or floating block cone and screw *4* and *5*, Fig. 72, have not become pounded loose from an unadjusted condition of the first style mold driving shaft clamp.

Mold Driving Shaft Friction Clamp

Upon the mold driving shaft a friction clamp is mounted, the first style type of which has two plates lined with leather friction shoes *5*, Fig. 74, which clamp the mold driving shaft. This clamp prevents the mold disk overthrowing through momentum when the disk comes to a stop after its casting or ejecting revolutions, so the studs will register with the stud blocks in the vise frame. The other end of the clamp is attached to a fixed pin in the mold gear arm. The tension of the clamp is regulated by a long screw *1* running through the plates; a spring *2* and nuts *3* complete the clamping device. Adjust the nut *3* (one of which is a lock nut) until the spring *2* causes the clamp to hold the driving shaft *4* just enough to cause the revolving mold disk to stop without chattering.

The new style device employed to prevent any circular overthrow of the mold disk, consists of two plates, or disks, the rear one of which *2*, in Fig. 75, is pinned to the mold driving shaft *6*; the front disk *1* is held stationary on the shaft by the mold gear arm supporting screw *4*. A leather disk *3* is interposed between the two disks. A spring *5* urges the disk *1* against the leather disk *3*. This friction device needs no attention or adjustment other than a small quantity of oil applied on oiling day to a hole in the top of the front disk bearing.

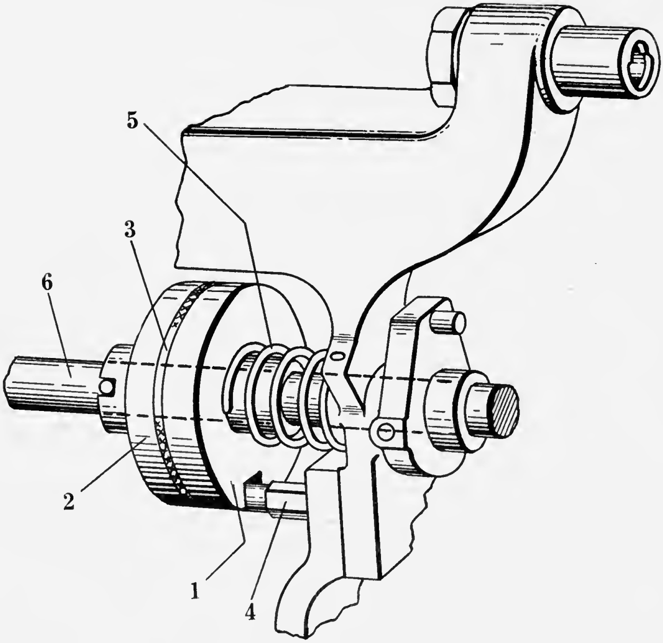


FIG. 75.—New Style Mold Disk Brake. This is the new style device employed to clamp the mold disk driving pinion shaft. The disk *2* is pinned to the shaft *6* and a leather disk is interposed between the rear disk *2* and the front disk *1*. A spring *5* constantly urges the front disk against the leather lining *3* and the rear disk *2*, which is free to revolve as the shaft revolves. The front disk *1* is stationary upon the shaft, being held by the pin 4 in the mold gear arm support. There are no adjustments to be looked after.

Mold Disk Guide

At *6*, Fig. 71, is shown the mold disk guide. This is held in place by one cap screw. The guide really has two functions, that of supporting the mold slide, and the extension prevents the disk springing away from the back knife while the bottom of the slug is being trimmed to type high.

Mold Disk Scraper

Held in place by one screw at the lower front end of the mold slide back of the mold disk, is a steel plate or scraper. This is suitably shaped to fit the inner surface of the disk. The function of the scraper is to prevent any metal particles packing between the mold slide and disk.

Mold Disk Stud

After several years of use, the mold disk stud bearing may become worn so that the disk will have forward and back play, between the disk bearing and the rear stud nut. That is, the disk will have end play because the stud

will appear to be too long for the bearing. The stud can be turned off several thousandths of an inch at the rear shoulder. This will bring the rear nut closer to the bearing in the arm. The play in the stud mentioned above is objectionable when so much of it is present that the back trimming knife cannot be properly set. End play in the stud will also cause liners and molds to be scored by the back knife.

Mold Cam Safety Lever

With the improved mold slide safety device any interruption of the normal advancing movement of the mold slide and disk will automatically disengage the friction clutch and stop the machine.

It has been previously mentioned that the "flopper" or a new style stop bar on the vise cap must be used to hold up the first elevator in high alignment position when using display molds 18 points or larger, because all matrices from 18 points up have the letter characters punched in auxiliary or high alignment position. If the mold disk studs do not match the stud blocks in the vise frame when the mold disk advances, or if a matrix or spaceband lodges between a mold and the vise frame parts, the mold cam safety lever will "break" and stop the machine.

This device forestalls the breaking of parts and prevents squirts. These interruptions may be described by saying that when an operator forgets to set the first-elevator filling piece in position when casting display slugs 18 points or larger, the device will function, because the mold cap strikes the first elevator back jaw and throws off the clutch through resistance set up which breaks a joint in the mold cam lever when the clutch is disengaged, and the machine will not operate until the obstruction is removed by putting the stop bar in place to hold up the first elevator in high alignment position.

The automatic operation is effected through a positive-operating and self-compensating linkage. Forward and back motions of the mold slide and disk are imparted through the intermediation of spaced rollers fastened to the mold cam lever. In normal operation of the machine, that is, if the filling piece or stop bar setting has not been neglected and nothing obstructs the forward thrust of the mold disk, the safety device will operate without functioning, but if any obstruction blocks the forward thrust of the mold disk, either at casting or ejecting strokes, this safety device will operate by "breaking" the mold cam safety lever joint, changing the relationship of the two rollers, which action throws the clutch and stops the machine, automatically.

During the normal operation of the machine there is no possibility of this automatic device unintentionally being put in operation, because it is so designed that the stress necessary to effect its operation is more than double the normal mold slide resistance, and will not cause the automatic safety device to operate, but immediately the mold slide meets with an abnormal interference the safety device functions.

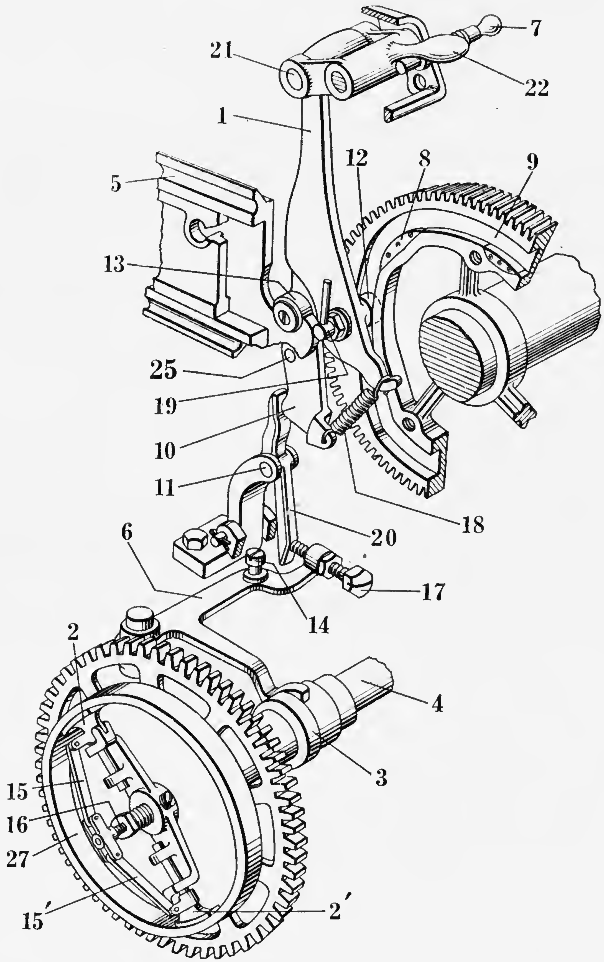


FIG. 76.—The Mold Cam Safety Lever. Detail Drawing and Perspective View. This device functions when any abnormal obstruction prevents the full forward stroke of the mold slide, and disengages the friction clutch, stopping the machine. The machine will not go into action again until the obstruction is removed.

If the operator, when using a display mold, eighteen points or larger, neglects to throw the filling piece or the new style first-elevator alignment stop bar over to position, in order to support the matrix line high enough so the lower back lugs of the matrices will properly register with the mold aligning groove, the mold cap will strike the first-elevator back jaw and the machine will come to a stop. If the mold disk locking studs are not in register with the stud blocks in the vise frame, the mold cam safety lever will "break" and throw the clutch out of action.

While the device has been arranged to prevent an interference with the normal operation of the machine, it is also sensitive enough to prevent injury or mutilation of the most delicate matrices in the event an operator forgets to throw the filling piece or new style stop bar when using a display mold 18 points or larger. This positive and sensitive operation is made possible by the provision of a unique compensating member which is so arranged as to automatically throw the friction clutch out of action as the mold disk approaches casting position.

Fig. 76 shows the mold cam safety lever illustrated in detail. A description of its action is made, which will show how it functions when the operator neglects to throw the filling piece or first-elevator alignment stop bar to position when using a display mold, 18 points or larger. Also, it functions when the locking studs do not match the stud blocks when the mold disk makes its forward stroke, either at casting or ejecting positions, or again, if a matrix or spaceband lodges between a mold and any of the vise frame parts.

As an illustration, the operator neglects to throw the filling piece or stop bar in order to position the first elevator in high alignment position upon the vise cap when about to use a 36-point display mold. The matrix line is sent over and the first elevator descends upon the vise cap. The advancing 36-point mold cap strikes the first-elevator back jaw before the mold has advanced completely against the matrix line.

How the Mold Cam Safety Lever Functions.—Normally, the mold cam lever *1*, pivoted at *21*, Fig. 76, is caused to advance the mold slide *5* to casting position by the mold cam shoe *8* in the mold slide cam *9* by the spaced rollers *12* and *13*, mounted on the mold cam lever *1*. Now, an obstruction has been set up by the 36-point mold cap binding against the first-elevator back jaw, and the mold slide *5* is immovable. This causes the steel mold slide cam shoe *8* to "break" the position of the mold cam safety lever *10* pivoted at *25*, which alters the relationship of the rollers *12* and *13*. The lower end of the mold cam safety lever *10* bears against the mold disk slide safety stop lever *20*, pivoted at *11* in a fixed bracket, bearing against the screw *17*, which moves the forked lever *6*, so that the flange *3*, upon the driving shaft *4*, connected to the clutch rod *16*, causes the links *15* and *15'* to disengage the leather-faced shoes *2* and *2'* from the inside rim of the clutch pulley *27*.

It will now be necessary to back the machine a trifle and throw the filling piece or first-elevator alignment stop bar to position on the vise cap so that the first elevator will be held up in high alignment position. When the machine is backed, the pressure will be released from the mold cam safety lever *10* and the spring *18* will return the lever to normal operating position. At this time, the rollers *12* and *13*, will again assume their proper spaced relationship.

The presence of this safety device in no way interferes with the freedom of movement of the mold cam lever *1*, consequently this lever can be lifted by the handle *22* and held up in that position by the handle pin 7, when it is de-

sired to withdraw the mold slide *5,* which disengages the roller *13* from the hook in the rear end of the mold slide *5.*

Adjustment of the Mold Cam Safety Lever device is simple. First, see that the normal forward thrust of the mold disk is made so that the mold advances within .010″ of the vise jaws, as explained elsewhere in this book. This adjustment is made by means of the eccentric pin *19,* upon which the roller *12* is mounted. Next, see that the space between the flange *3* and the machine bearing is 15/32″, and the space between the flange *3* and the forked lever *6* is 1/32″ when the machine is in action. Now back the machine a trifle from normal position and open the controlling lever. Adjust the screw *17* in the forked lever *6* until there is a space of approximately .010″ between the end of the adjusting screw *17* and the mold disk slide safety stop lever *20.* This can be determined by passing two or three strips of paper (measuring .010″ thick, or a steel feeler gauge) between the screw and the lever.

If the clutch flange *3* and the forked lever *6* are not in a very good state of adjustment, or there is too much space between the mold disk slide safety stop lever *20* and the adjusting screw *17,* the machine will overthrow considerably before the safety device can function. On the other hand, if there is no space at all between the lever *20* and the screw *17,* the leather clutch buffers on the shoes *2* and *2′* will not be permitted to grip the inside rim of the clutch pulley *27* and the machine will stall.

Chapter XV

THE METAL POT

The metal pot is a reservoir containing molten metal from which the slugs or lines of type are cast. The metal is held at the proper degree of temperature by an automatic thermostat mounted upon the pot cover. At each downstroke of the pump plunger a quantity of metal is ejected into the mold from the pot crucible, through suitable openings in the pot crucible mouthpiece. The metal pot and pot cam mechanism comprise a means of advancing and locking the pot mouthpiece tightly against the mold with spring pressure transmitted through a pot lever, and a device to forcibly separate the mouthpiece from the slug base (when necessary).

The pot, generally speaking, is square in its dimensions, and is supported by two rather awkward-looking legs which extend out and downwardly from the lower front edge of the pot jacket to the same shaft in the machine base upon which the vise frame is pivoted. The pot legs are pivoted where they rest upon the shaft and are suitably shaped at this point to carry set screws for adjusting the metal pot to align the mouthpiece for parallelism and height so that when locked against the mold it will have fairly true contact in order to prevent metal escaping from between the mold and mouthpiece at the time a slug is being cast. At the rear of the pot, a lever pivoted at its upper end and carrying a cam roller, supports the pot against the pot cam. The cam roller contains nine smaller rollers to reduce friction at this point from the weight of the metal in the pot and the pressure caused from locking the pot against the mold during the matrix alignment and casting positions. At its lower end, the lever is connected to the pot jacket by an eyebolt and spring, the purpose of which will be taken up in detail later.

Inside the pot jacket is placed a crucible which is somewhat smaller than the jacket, in order to permit the packing of asbestos composition cement between the two parts for the purpose of insulating the molten metal against loss of heat through radiation. In the crucible there is a pot well containing a rod and plunger. The plunger is actuated by a separate cam alongside the pot cam on the main cam shaft, through a lever and spring. The spring is mounted above the metal pot, and at the proper instant, due to a depression in the pot pump cam, the plunger makes a downstroke (an average distance of 1½") which forces the molten metal from the well, through the throat of the pot crucible and out from the mouthpiece jet holes into the mold cell.

The metal in the crucible can be melted by any one of three different types of heating devices—gas, electricity or gasoline burner. At the present time gas is the heating medium most generally in use, although electrically-heated metal pots are making rapid strides in displacing the gas-heated

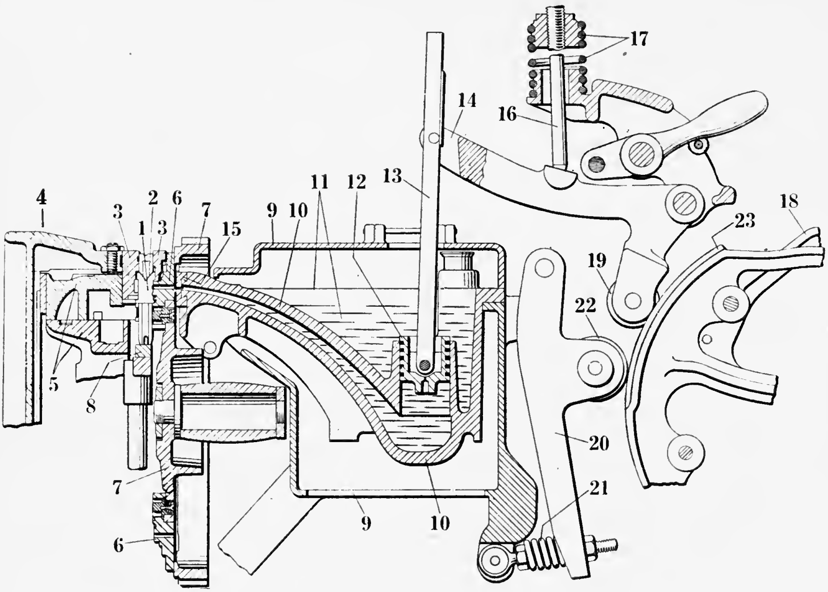


FIG. 77.—Principal Parts of the Casting Mechanism (cross-section diagram) in position just before a slug is to be cast. The line of matrices *1* and the spacebands *2* are held in position before the mold *6* by the first-elevator slide *4* and its front and back jaws *3* and *3*. The vise cap *5*, which arrests the downstroke of the first elevator *4*, also takes the strain of the locking of the metal pot mouthpiece *15* against the back of the mold *6* so that the matrix line *1*, the mold *6* and the mouthpiece will be locked tightly together while the molten metal is being ejected from the metal pot crucible *10*, through the mouthpiece *15* into the mold *6*. The matrix line *1* has been expanded to the limits set by the vise jaws by the action of the justification bar *8* driving the spacebands upwardly.

The metal pot is indicated at *9*, the crucible which holds the metal at *10* and the molten metal by the broken lines *11*. The metal pot *9* is caused to move forward and is locked tightly against the back of the mold *6* by the pot cam *23*. The connection of the metal pot with the pot cam is through the pot lever *20* and the pot lever cam roller *22*. The pot lever *20* causes the metal pot mouthpiece *15* to lock against the mold *6* with a yielding pressure through the powerful spring *21*.

The pot pump plunger *12* rests in the crucible well, ready to eject some of the metal *11* into the mold cavity *6* when permitted to do so by a dip in the pot pump cam through pressure of the spring *17* and its connection through pump spring rod *16*, the pump lever *14* and the plunger rod *13*. The pot pump lever *14* is supported on the cam *18* by the cam roller *19*.

After the pot pump plunger *12* has made a downstroke to eject molten metal into the mold and against the letter characters of the matrix line *1*, it will be caused to rise through action of the pot pump cam *18*. The pressure of the mouthpiece *15* will be relieved from the mold and the metal pot will recede, due to action of the pot cam *23*.

pots. The gasoline burner is only applied to metal pots in those localities where gas or electricity are not available.

Upon the face of the pot cam are placed two hardened steel shoes. The first or short shoe is higher than the second one, and forces the pot with heavy pressure against the mold to align the matrices so that the letter characters on the slug will be of even height. The metal pot in advancing, first aligns the matrices facewise through the action of the cam forcing the mouthpiece against the mold and matrices. The matrices, during this pressure of the pot, bank against the adjusting bar in the first-elevator jaw, as explained previously in the section relating to the first elevator.

The spring at the lower end of the pot lever permits the pot to lock against the mold with a yielding or cushion pressure.

After the first advance of the pot against the back of the mold, it recedes a trifle, owing to the contour of the pot cam, so the justification levers while making their second stroke, can finish driving up the spacebands so as to fully and tightly space out the matrix line against the limits set by the vise jaws.

The second forward stroke of the pot, caused by the long steel shoe upon the surface of the pot cam, then takes place to lock the pot tightly against the mold and the plunger then descends, forcing metal into the mold against the letter characters of the matrix line.

A small cam affixed to the left side of the mold cam and driving gear engages a lug on the pot lever, which in the case of metal that is a little cool in temperature, forces the pot mouthpiece away from the slug base after the cast.

The Pot Lever

The pot lever, interposed between the metal pot and the cam, furnishes a springy or yielding lockup of the metal pot mouthpiece when pressed against the mold. The pot lever spring is also a safety device should anything lodge between the first elevator head, the mold or the metal pot, in which case the spring will allow the lever to give and prevent accident to the machine. When the pot is locked tightly against the mold during the cast, and the cam roller *2*, Fig. 78, is in contact with the long pot cam shoe, the spring *10* is under compression, and there should be ⅛″ space between the lever *1* and the nut *8* at the rear end of the eyebolt *6*. There is a sleeve *9* pinned to the eyebolt *6*, placed there to prevent misadjustment of the nuts *7* and *8*. The nut *8* may be spoken of as the compression nut, while the nut *7* is the tension nut; that is, the stiffness with which the pot locks against the mold can be increased or decreased by moving the tension nut *7*.

The lever *1* is pivoted at the top by a shaft *12* to the pot jacket lugs *16* and *17*. In order to position the roller midway between the mold cam and driving gear and the pot pump cam, a simple device is now applied to machines. The screw pin *13* is screwed into the lever shaft *12*. The pot lever *1* is narrower at the top than the space between the pot jacket lugs, *16* and

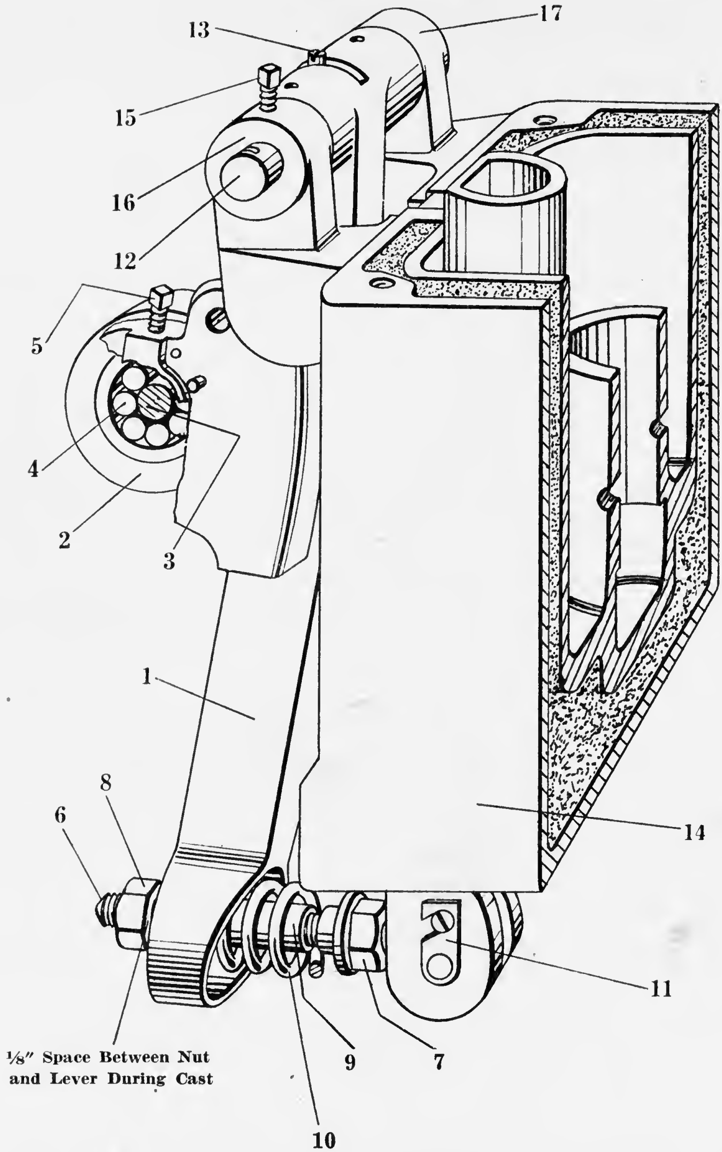


FIG. 78.—The Pot Lever is shown in this view. The lever *1* is interposed between the metal pot and the pot cam and is pivoted at the top on a shaft *12* passing through the metal pot jacket lugs *16* and *17*. When the pot mouthpiece is locked tightly against the mold, the spring *10* furnishes a yielding connection. The cam roller *2* sustains the weight of the metal pot *14* against the pot cam. Inside the cam roller *2* are nine smaller anti-friction rollers (one of which is indicated at *4*), surrounding the pin *3*. These rollers are packed in grease and reduce friction.

17, and is slotted midway to accommodate the screw pin *13*. The pot lever, at the point where the roller *2* is mounted, must not touch the cams at either side. If the lever is positioned too close to one side, loosen the shaft set screw *15* and move the shaft *12* sidewise until the pot lever has clearance between the cams.

Occasionally (from three to six months) the pot lever should be removed from the machine. The purpose in removing it is to clean and lubricate the cam roller *2*, the roller pin *3* and the nine anti-friction rollers *4*.

The lever can be removed from the machine by placing a pig of metal or block of wood between the pot jacket lug *16,* Fig. 78, and the pot pump lever cam roller *19,* Fig. 77. The object in doing this is to transfer the weight of the metal pot from the roller *2,* Fig. 78, to the lug *16* on the pot jacket *14*. Loosen the wing pin *11* and take it out; remove the screw pin *13*; loosen the shaft set screw *15* and pass a screwdriver through the hole in the pot lever shaft *12*. If the machine is equipped with washers which locate the lever between the mold cam and driving gear and the pot pump lever cam, it will be necessary to catch them as the shaft *12* is withdrawn. Support the pot lever *1* at its lower end as the pin *12* is pulled out. The pot lever *1* can now be lowered and taken out from beneath the metal pot. While the lever is away from the machine, do not disturb adjustment of the eyebolt nuts *7* and *8*. Turn out the set screw *5* and withdraw the pot lever cam roller pin *3* to release the cam roller, nine small anti-friction rollers *4* and two thin washers which separate the rollers *4* from the pot lever. Wash all the parts in kerosene. If any of the anti-friction rollers are crazed or broken, replace with new ones. Lay the cam roller *2* down on a flat surface, put in one washer; coat the inside of the space around the edges with stiff graphite grease; set the cam roller pin *3* end up in the center; squash in the nine anti-friction rollers, finally placing the other thin washer on top of the anti-friction rollers. Wipe off any surplus grease. Withdraw the cam roller pin *3*. The grease will hold the nine small rollers in place while returning the assembled cam roller to the pot lever. Tighten the set screw *5*.

At this time thoroughly clean out the two oil holes at the top of the lever bearing which lubricate the pot lever shaft. Return the lever to the machine in reverse order from that used in its removal. The pressure exerted by the pot cam against the cam roller through tension of the pot lever spring is very great and periodical attention should be given, so that the lever will always have proper lubrication.

Pot and Pump Cam Wipers

These wipers keep the working faces of the pot and pump cam free from the abrasive action of dirt and grit, and also supply an oil film which reduces wear from the severe stress of the rollers which travel over them.

Each wiper is attached to the pot lever and held in position by extension springs, Fig. 79. This insures uniform and positive engagement of the wiper

felts with the cam surfaces. The wiping felts will last indefinitely, but in the event replacement is needed, the wiper brackets are easily removed by withdrawing a cotter pin and disconnecting the spring.

Cleaning the Plunger and Well

The pot pump plunger used on 30-em machines is two inches in diameter and fits in the pot crucible well with little clearance between the parts. After several hours of operation, a dross coating forms in the well. The plunger and well should be cleaned daily. If neglected too long, the output of the machine will be seriously affected. For this reason the oxide coating which accumulates must be removed from the plunger with a stiff wire brush; the well must also be cleaned at the same time by the use of a hand scraper or rotary brush. These tools are made in several forms, any one of which is suitable for the purpose. If the rotary wire brush is used, always turn it clockwise in the well, to avoid breaking off any of the bristles which might remain submerged in the metal and later cause the plunger to stall the machine while being raised after making its casting stroke. Before replacing the plunger, clean the two metal intake holes *6*, Fig. 80, which are apt to clog with dross; use for this purpose the hooked end of the pot mouthpiece wiper. A rotary scraper is also made for cleaning the well and

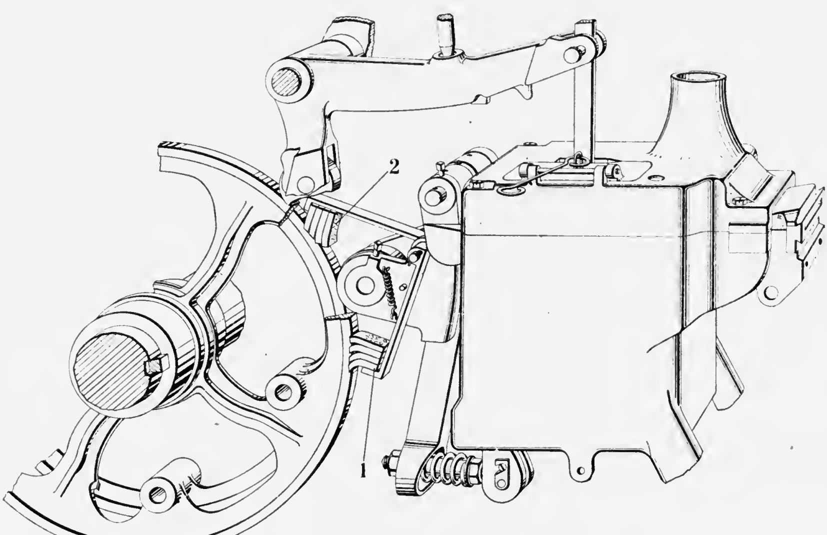


FIG. 79.—Cam Wipers. These two cam wipers are held by brackets fastened to the pot lever. The pot pump cam wiper is indicated at *1* and the pot cam wiper at *2*. These wipers keep the faces of the two cams clean.

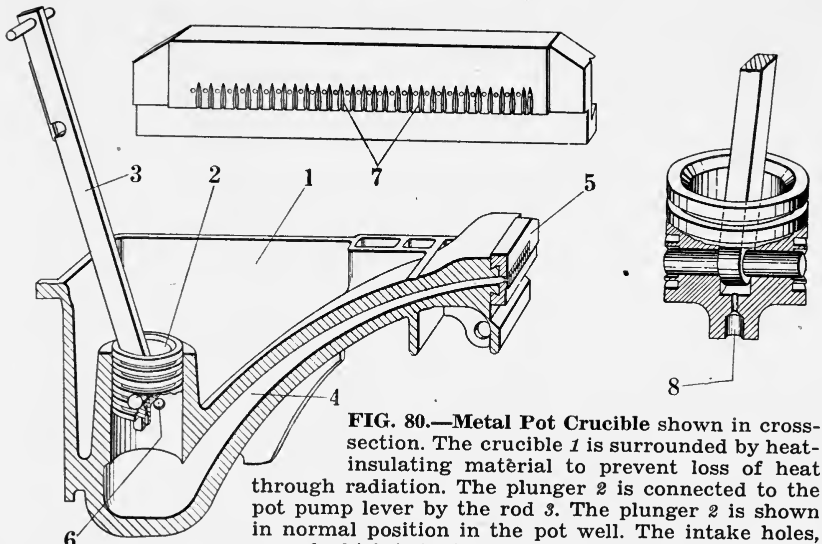
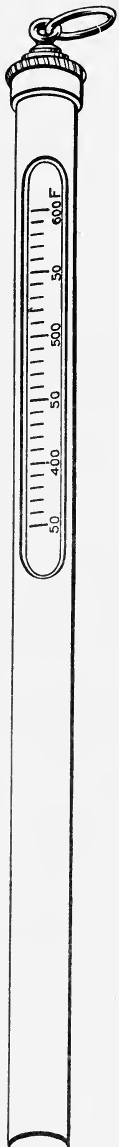


FIG. 80.—Metal Pot Crucible shown in cross-section. The crucible *1* is surrounded by heat-insulating matèrial to prevent loss of heat through radiation. The plunger *2* is connected to the pot pump lever by the rod *3*. The plunger *2* is shown in normal position in the pot well. The intake holes, one of which is indicated at *6* (there are two on opposite sides of the well), permit metal to flow under the plunger after each cast to replenish the supply in the well after each cast. As the pot rocks forward to make a cast, it also rises, so that when the mouthpiece is locked against the mold, the plunger covers the metal intake holes. In this way no metal can escape back into the crucible when the plunger descends. The passageway *4* is called the crucible throat. The mouthpiece *5* has small jet holes, simply called the jets, spaced about one 12-point em apart for the length of 30 ems; the metal is forced through these jets by the action of the plunger.

The vents 7 in the detail drawing are for the purpose of permitting the air to escape from the mold cell as the metal displaces it. These vents should always permit enough metal to escape so that the sprues will be from one-half to three-quarters of an inch in length. Clean out the vents regularly with a knife blade point or scriber. Dross has a tendency to close them. If the vents are not deep enough, some air will remain in the mold cell, which will cause air cells in the slug body. The mouthpiece jets, too, must be cleaned out once in a while to restore them to original size. Use a small broach or No. 52 twist drill. A 1/16″ twist drill, fractional size, will also be suitable to open the jets when they have become partly closed so as to obstruct the flow of metal.

Some of the vent and jet projections will remain attached to the slug base, having solidified before the mouthpiece has retreated from the mold. It is the function of the back trimming knife to shave off these projections so that each slug will be exactly type high, which is .918″.

In the detail drawing the plunger has been partly broken away for the purpose of showing the pressure relief hole *8*, which is centrally drilled in all plungers. The purpose of the hole is to relieve the pressure when the plunger makes its casting stroke and thereby cause a follow-through or continuation of the stroke after the mold becomes filled so the plunger will become more or less self-cleaning. If an operator casts short-measure slugs for several hours and the plunger stroke is limited, due to no relief from pressure, an incrustation will form in the crucible well at the end of this short plunger stroke, and subsequently, when larger slugs are cast, the plunger would likely stick at that point in the crucible well until several strokes have broken up the line of incrustation. It is, of course, likely that on old machines where the plunger and well have become worn, the hole should be plugged because sufficient metal to relieve the pressure would escape from between the plunger and well.



consists of two or three flat blades mounted on a turning rod, the blades bearing against the side wall of the well under spring tension.

It has been previously stated that as the metal pot rocks forward to lock its mouthpiece against the mold, it also rises, which action closes the two well feed holes at either side of the plunger, that is, the pot rises while the plunger remains stationary. If the plunger is dirty it will also rise as the pot rises and the two feed holes will not be closed, so that when the plunger makes its casting stroke, a considerable quantity of the metal will be forced back into the pot through the feed holes and a light slug is likely to be cast.

Occasionally in a case of this kind, the plunger will rise with the pot and drop down upon the pot pump cam before the mouthpiece is locked against the mold. This action of the plunger ejects a small quantity of metal through the mouthpiece jets, which adheres to the back of the mold and partially solidifies. This solidified metal might prevent a tight lockup of the mouthpiece with the mold, thereby causing a back squirt.

Persistent maintenance of a low metal level in the pot crucible rapidly fouls the plunger through exposure to the air. Always have enough metal in the pot to cover the top of the plunger. It is best to keep the metal level an average distance of one-half inch from the top of the crucible rim.

In the course of time the plunger will wear and become smaller in diameter and the inner wall of the well will be elliptical in shape. If this condition is present, the top surface of the metal in the crucible around the plunger rod will be disturbed as the plunger descends, because some of the metal in the well will escape between the well and the plunger. The slugs will then be porous. A plunger several thousandths larger in diameter can be applied. Often a new standard size plunger will fill up the well cavity sufficiently to cast solid slugs.

FIG. 81.—**Thermometer** furnished by the Intertype Corporation, which is used to accurately regulate the temperature of the metal in the metal pot.

Forty-Two-Em Crucible

The 42-em crucible is similar in all respects to the crucible used in the 30-em machine, except that it is equipped with two plungers somewhat

smaller in diameter than the 30-em crucible plunger. Both are attached tandem fashion to the pump plunger lever by one long pin. Like the 30-em machine, the two plungers and pot wells should be cleaned daily.

Quick-Drop Attachment

What is known as a quick-drop attachment is applied to the pot pump cam at the front of the dip which permits the pump lever to make its casting stroke. There are two or three forms of this device, and all are designed to permit a sudden or sheer descent of the plunger when casting large display slugs. It can also be used when casting fine hairline border if difficulties are encountered in securing a good face on the slugs. It is advisable to keep the crucible normally full of metal while using the attachment. The latest form merely requires the unhooking of a small latch which permits the block to be thrown back out of the way.

The Thermometer

Fig. 81 represents a view of the thermometer sold by the Intertype Corporation, with which the temperature of the metal can be exactly regulated to proper casting heat. This thermometer also indicates the maximum and minimum temperatures between the throwing off and on of the heat-regulating thermostats. It can be used either with gas or electric pots. Order under part number W-88.

Gas Burners

In Fig. 83 the metal pot is represented by the dotted lines. The gas burners, the piping system and the thermostat are in position and the parts are numbered for convenience of explanation.

How Gas is Supplied the Burners.—First of all, the gas passes through the supply pipe into a plant governor, and from there to the main valve *9*, which is also used to shut the gas off completely from the burners when desired. The bracket *14* is a swivel for the valve *9* so that the burner piping will be free to turn slightly with the metal pot movements. As stated above, the gas enters at valve *9* from the main supply pipe line and travels upward through pipes *16* and *17* into the thermostat *10*. The amount of gas that may pass through the thermostat *10* is regulated by the adjusting screw *13*, which, after being adjusted for proper flow of gas, is held stationary by the jam screw *15*. The new style device for holding the adjusting screw *13* in adjusted position consists of a tension spring coiled about the stem of the screw. The locking screw *15* is now omitted. As the gas passes through the top pipe of the thermostat *10* it is directed downwardly through the pipe *18* to the main burner *1*, throat burners *2* and the back burner tube *4*. There is a dividing web between the main burner *1* and the throat burners *2* so that each burner will have an independent supply of gas. This provides separate mixing chambers for the main and throat burners. The gas consumed by the

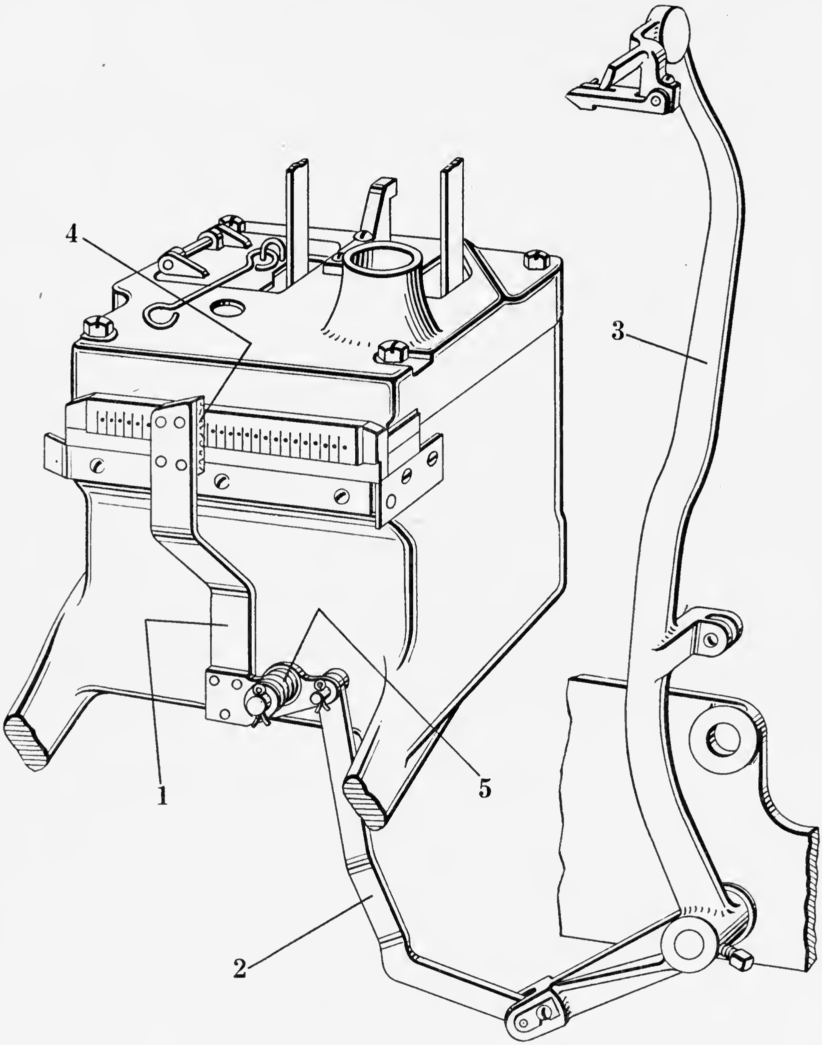


FIG. 82.—Pot Mouthpiece Wiper. A pot mouthpiece wiper is applied to 42-em Intertypes to wipe any metal accumulation from the face of the mouthpiece. It is actuated by the spaceband transfer lever and consists of a wiper arm *1*, attached to a stud at the front of the metal pot, and connected to the spaceband transfer lever *3* by a link *2*. The wiping surface *4* can be renewed whenever necessary by taking the arm *1* from the pot after the cotter pins have been pulled from the arm stud and link connections, when a new wiper lining may be rivited to the arm. The wiper lining is held against the pot mouthpiece by the arm *1*, through pressure exerted by the spring *5*.

throat burners *2* is furnished by a separate valve and mixer *6*. The gas fed to the pot back burner *4* also has a separate gas feed through the valve *5*. The thermostat controls the amount of gas fed to the main pot burner *1*, the throat burners *2* and the back burner tube *4*. The mouthpiece burner *3* receives its gas from the valve *12*, which controls the gas flame entirely apart from the thermostat *10*. Valves *5*, *6* and *7* are intended normally to be left wide open, but if necessary, can be partly turned off to regulate the size of the flame for best results.

The mixers used on the gas burners are of the ordinary Bunsen type. The gas passes through the valve into the mixing chamber from a little brass tip or thimble, in the center of which is a small hole. Air is taken through openings in the bottom of the bulb-like mixing chamber, supplying oxygen which mixes with the gas, so that when consumed the flame will have the greatest heating power. Improper air mixture will cause yellow flames which will deposit lamp-black or soot where the flames touch the crucible.

Emergency Torch.—The valve *8* is intended to be used by connecting a rubber tube having at its free end a hand torch, which can be used as an auxiliary flame to melt out a frozen mouthpiece; or in case the burners or thermostat are removed for cleaning, the torch can be placed underneath the pot crucible in order to keep the metal in a molten state while the parts are being cleaned. Special reference is made to the governor tube guard which is immersed in the metal at its lower end. If the metal in the crucible is frozen solid the governor could not be returned to those early Intertype pots not equipped with the pot gas governor tube guard, which fastens to the pot cover.

Cleaning the Gas Burners

Once every three or six months remove the burners (including the mouthpiece burner tube) from the machine. The mouthpiece burner accumulates dirt and dross, which should be brushed off. The perforations in the tube can be opened with a small drill or wire. The main burner, also, accumulates dirt and objectionable oxides which affect the heating power of the flame and render temperature control difficult.

The burners are conveniently fastened to the feed pipes with small unions that make it easy to take them out. After the burners are removed, wipe out the heating orifices under the crucible with a cloth swab.

Do not attempt to take the top plate from the main burner after it has been in use for some time, without having on hand an extra top plate and bolts and nuts which hold the parts together. The plate and screws become brittle from the heat and may crack. When replacing the parts after they have been cleaned thoroughly with a wire brush, coat the top plate bolts and nuts with graphite grease, so that the next time they are removed the parts will separate easily.

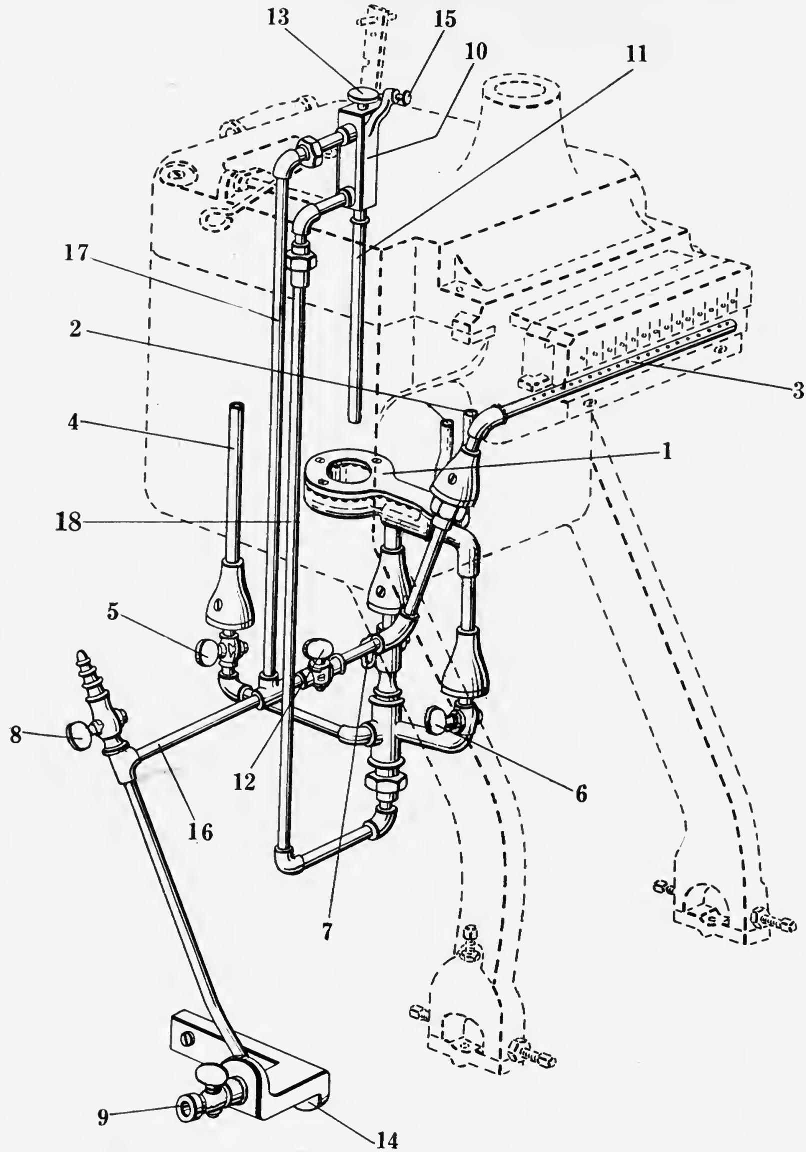


FIG. 83.—Metal Pot Gas Burner and Thermostat System as applied to the Intertype. The metal pot is indicated by the dotted outline. The main burner is indicated at *1; 2* shows the throat burner tubes; *4* is the back burner tube, and *3* is the mouthpiece burner. The thermostat *10* is positioned upon the pot cover and automatically regulates the flow of gas to the burners underneath the pot crucible. The mouthpiece flame is regulated separately by means of the valve *12*.

The flames from the gas burners should be of a greenish-blue color, or blue with occasional faint yellow tips, which will indicate thorough mixing of the gas with air while passing through the burner mixing chambers. A yellow colored flame indicates a lack of oxygen, which will cause the flame to deposit lampblack or carbon on the crucible. This lampblack coating, if heavy enough, will act as an insulator.

The Intertype crucible is fitted with separate flues for the pot and mouthpiece burners. The dividing wall is so arranged that the fumes of combustion from the main pot burners do not affect the mouthpiece burner flame, but pass by into the pot chimney.

Burner and Gas Governor

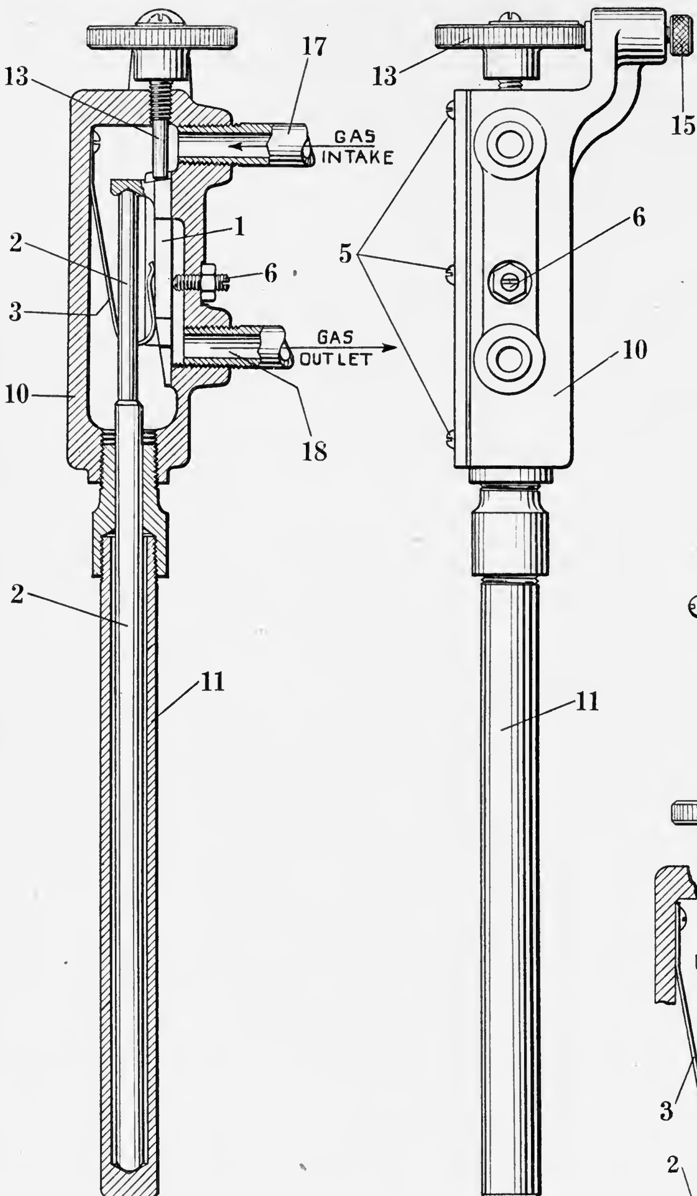
In regulating the pot temperature, the center pot burner and the mouthpiece burner are the controlling factors. The best slugs are secured if the pot temperature is a little lower and the mouthpiece temperature a little higher than is commonly considered correct, namely, 550 degrees. The plant pressure governor is adjusted by adding to or removing weights from the governor diaphragm, in the case of an artificial gas governor; or by a screw adjustment on the valve stem, in the case of a natural gas governor. When the artificial gas governor is used, the mercury around the edge of the diaphragm acts as a seal only, and the gas pressure at the burner should not exceed 1″ (water). The temperature governor which is attached to the pot can be adjusted by means of the thumb screw provided. Go slow when making governor adjustments, allowing half-hour intervals between such changes to insure completion of the effect. When casting display slugs, some consideration should be given the temperature of the mold which heats up from rapid recasting. In this case, turn down the mouthpiece burner.

See that the metal in the pot is not too hot. Always use a thermometer, which can be obtained from the nearest agency. If the metal is too hot, adjust the governor to turn down the main ring burner. Don't expect immediate results from the latter changes; to reduce the metal temperatures in the pot quickly, dip out some of the hot metal and replace it with cold pigs.

If the gas flame is white or yellow, see that the gas is not burning in the mixer and that the burner is not clogged. It may be necessary to remove and clean the burner. At this time see that the opening in the nozzle or cap is not too big.

If the gas flame is noisy and greenish in color, see that there is not too much air in the mixture, and that the gas pressure is not too strong; if necessary, take the burner apart and enlarge the size of the cap or nozzle openings.

Heat the Metal Slowly.—When first starting to heat the metal, turn on the flame gradually. Too rapid heating may cause the crucible to crack, as the metal at the bottom of the pot will melt and expand with such force that either the crucible will crack or the metal will be forced through the pores in the iron and drop down upon the burner or the base of the machine. The



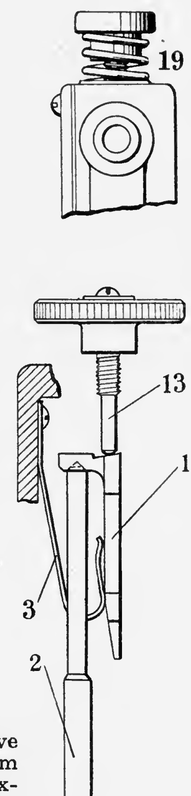


FIG. 84.—The Intertype Gas Governor is extremely sensitive to the slightest change in metal temperature. The aluminum tube *11*, which is immersed in the metal, is lengthened by expansion when the metal reaches the temperature for which it

has been set, and will be shortened by contraction as the metal cools when pigs are put in the crucible to replenish the supply. As the metal cools, the tube *11* is shortened, raising the steel rod *2*, which bears against the valve *1*, permitting more gas to flow from the intake pipe *17* into the governor chamber and through the outlet pipe *18* to the burners. As the metal temperature increases, the aluminum tube *11* expands, letting the rod *2* fall away from the valve *1*. The valve, due to pressure of the spring *3*, moves toward its seat around the gas outlet pipe *18* until it touches the by-pass screw *6*. When the valve *1* is resting against the by-pass screw *6*, only enough gas is permitted to flow through the outlet pipe *18* to keep the burners ignited until the metal cools again.

Intertype crucible will not crack readily because of the auxiliary burner, but it is well to be careful not to heat the metal too quickly.

Casting Heats.—The average casting heat of metal is from 525 degrees to 550 degrees F. A 5-point slug will require a higher temperature (575 degrees) than a 14-point slug (525 degrees). These are given as average figures to indicate the difference in metal temperatures between extreme slug sizes.

The Gas Governor

The Intertype thermostatic gas governor is simple in operation and quite effective in maintaining uniform control of the metal temperature. The principle of contraction and expansion of a metallic part which is sensitive to the slightest temperature variations, is utilized to control the flow of gas to the burners.

Operation.—In Fig. 84, *10* represents the governor valve case; *11* is the aluminum tube which has a high coefficient of expansion, and as it is lengthened or shortened by the varying degrees of metal heat, it raises or lowers the rod *2*. Rod *2*, at its upper end, rocks the L-shaped valve *1*, pivoted against the lower end of the adjusting screw *13*, to open or close the gas exit *18*. The valve *1* is held through pressure of the valve spring *3* so that it will follow the position set for it by the adjusting screw *13* and the valve rod *2*; the spring *3* also prevents valve *1* vibrating from motions of the metal pot, upon which it is mounted.

Screw *6* is called the by-pass screw and prevents the gas outlet being closed entirely by the valve *1*. This screw should be set to permit enough space between the valve and governor case so that a sufficient amount of gas will be supplied the burners to prevent the flames being extinguished if the metal becomes so hot that the valve *1* is released when rod *2* is let down by the lengthening (or expansion) of the aluminum tube *11*.

As stated above, the amount of gas passing through the thermostatic governor to the burners is regulated by the position of the valve *1* over the hole of the outlet pipe *18*, which position is controlled by the action of the aluminum tube *11*. The tube will lengthen under high temperature and release its pressure upon rod *2*, at which time the valve *1* will close against the by-pass screw *6*, providing sufficient gas for the burners until the metal cools; then the tube *11* will contract, pushing upwards on rod *2*, opening the

valve *1* from its by-pass screw seat *6*, permitting more gas to flow to the burners.

Never attempt metal temperature regulation with by-pass screw *6*. Use the dial on the adjusting screw *13* to adjust the leverage of rod *2* against valve *1*. After the temperature of the metal has been properly adjusted, lock the adjustment by tightening jam screw *15* against the dial of adjusting screw *13* on the first style thermostat. In the case of the new style thermostat, the setting of the adjusting screw *13* is automatically maintained by the spring *19*, shown in the detail drawing.

Adjusting the Thermostat. — Turning the adjusting screw clockwise (down) raises the flame to increase the metal temperature, and a counterclockwise adjustment lowers the flame to lower the metal temperature.

Remove the governor from the pot occasionally for the purpose of cleaning out the valve chamber in the casing. Before taking out the case cover screws, have on hand an extra mica gasket, or "window," and some extra screws. The cover screws sometimes burn in from the heat, and when turning them a screwdriver might slip and puncture the mica window. Upon replacing the case cover screws *5* coat them with graphite grease. This will insure easy removal the next time the governor is to be cleaned. The latest thermostats are fitted with a steel plate instead of the mica window.

Unscrewing the expansion tube from the case is not a necessity. If the pot is not fitted with the steel tube guard, the tube may become bent from jamming pigs against it, or by the careless use of a screwdriver around the tube. The tube can be straightened without disconnecting it from the case by rolling it on a flat surface while tapping with a wooden mallet. The later style governor tube is screwed into a steel coupling, which in turn is fastened to the bottom of the case.

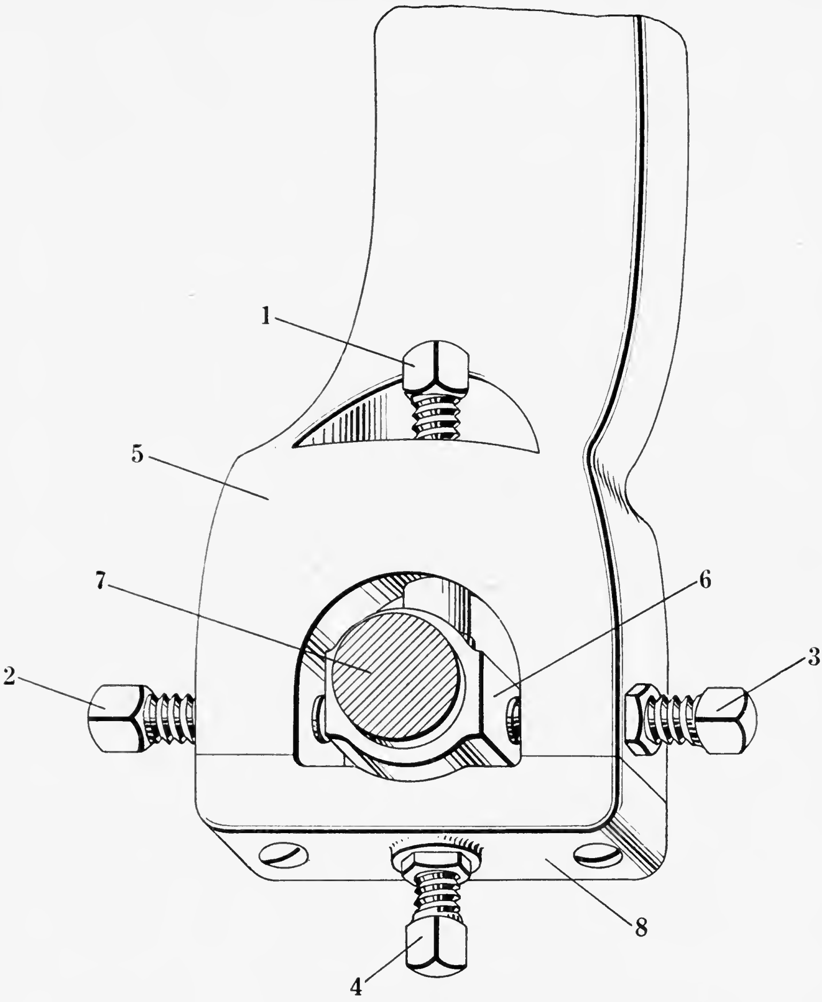
Mouthpiece and Mold Parallelism

Depending upon the casting heat used and the nature of composition being done on the machine, the metal pot mouthpiece may occasionally become warped out of parallelism with the mold. If this condition is present, metal will escape between the mouthpiece and mold, causing back squirts. The mouthpiece must then be filed or dressed true again.

Immediately following the application of a new mouthpiece, this information will be of value.

To determine whether or not the mouthpiece is warped, use a Prussian blue or red lead test. Either of these powders is mixed with machine oil to the consistency of thick cream.

Proceed as follows: Run the machine ahead until the first elevator rests upon the vise cap, lower the vise to second position; disconnect the plunger pin; lower the mold cam lever handle; disconnect the ejector lever link from the ejector lever; withdraw the mold slide until the disk is out of engagement with the mold driving pinion.



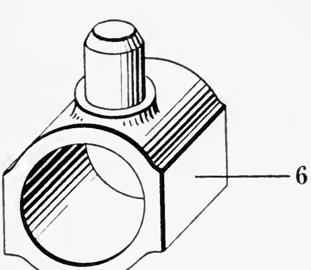


FIG. 85.—Metal Pot Leg Adjusting Screws. The metal pot is pivoted by each of its legs upon a bushing *6* which in turn are supported by the vise frame shaft 7. The screws *1*, *2*, *3* and *4* in the pot legs are adjusted against the bushing to determine the exact relation of the pot mouthpiece with the mold at the time a slug is cast. The screws *2* and *3* are adjusted to bring either side of the mouthpiece closer to or farther away from the mold until both ends contact evenly throughout its length. The screw *1* in each pot leg, when adjusted after loosening screw *4*, raises or lowers the pot vertically until the mouthpiece jets show round and full along the constant or smooth side of the slug.

Inspect the back of the mold and scrape off any metal that may have accumulated on its base with a piece of brass rule; clean the mouthpiece with a wiping cloth. Apply either Prussian blue or red lead to the back of the mold with a cloth folded into a two-inch square. With the mold in horizontal position at the top of the disk, push the mold slide back until the disk is again in engagement with the mold disk driving pinion; raise the mold cam lever handle and close the vise; it is not necessary to connect the ejector lever link at this time. Go around to the driving clutch and turn the machine ahead until the mouthpiece contacts with the mold through pressure caused by the short pot cam shoe; pass the cam shoe back and forth over the pot lever roller two or three times, then back the machine until the mold disk has retreated from the vise and stop it just before the first elevator rises from the vise cap. Open the vise and pull out the mold slide; look at both the mouthpiece and back of the mold to determine the contact of the two parts. If the mouthpiece shows contact at both ends or if it touches only in the center, it is warped; if spotty along its entire length, it will need dressing with a file or an aloxite stone. Prior to using a stone on the mouthpiece, soak the stone in machine oil to prevent steel particles filling in the pores.

Adjusting the Pot Legs.—If the mouthpiece shows a transfer impression at one end only, in all probability one of the pot legs will need adjusting to bring the end of the mouthpiece which is not contacting nearer to the mold. This is done as follows: In Fig. 85, *5* is the pot leg; *7* is the shaft upon which the pot legs *5* rest; *6* is the bushing on the shaft *7*, against which the adjusting screws *1*, *2*, *3* and *4* are tightened to locate the position of either leg and thereby determine the relation of the mouthpiece with the back of the mold.

To bring the left side of the mouthpiece closer to the mold, the left pot leg *5* must be moved forward by turning out screw *3* and following up by turning screw *2* inwardly the same amount. Adjust the screws not more than half a turn each time. Several impressions may have to be taken and the pot leg adjusted each time before a true relation of the mouthpiece with the mold is obtained. Always tighten the adjusting screw check nuts to prevent the adjusting screws working loose. Never jam the adjusting screws, *1*, *2*, *3* and *4* very tight against the bushing *6*—just bring them up enough to take out any play between the parts, but *do* tighten the check nuts.

Screw *1* raises or lowers the pot to align the mouthpiece jets just above the constant or smooth side of the mold cell. If the adjustment has been properly made, the jet marks which remain on the slug after the jet projections have been trimmed off by the back knife, will be wholly within the slug base, smooth side. It will be necessary to turn out screw *4* in the pot leg cap before adjusting screw *1* to raise the position of the mouthpiece in relation to the mold.

If the screws *2* and *3* are to be moved very much, always look at the relation between the pot lever roller and the two main cams between which it rests on the pot cam. Sometimes, if the screws have been adjusted consid-

erably, the pot lever will be swung to one side so much as to rub one of the cams, preventing proper lockup of the mouthpiece against the mold.

Lubricate the pot leg bushings on the regular oiling day.

Clogged Crucible Throat

A gas-heated metal pot that has been in use a long time may have its crucible throat clogged with a patch of hard dross or oxide at a point just above the throat burners. Clogging of the throat is an exception rather than the rule and can be attributed to any one of three reasons: Long continued maintenance of a low metal level in the pot crucible, poor condition of the metal, or the intense heat generated over a small area by the crucible throat tube burners. It will be difficult to secure a good slug with perfect face for the reason that the metal forced through the crucible throat will be obstructed by the oxide deposit. It will then be necessary to remove the mouthpiece and clean out the oxide with a dross saw or a long hacksaw blade. The dross saw is curved to fit the crucible throat and has teeth on both edges of the blade. After clearing the throat, place a metal container under the crucible mouth; work the plunger up and down several times in order to float out the particles of oxide loosened by the saw.

Mouthpiece Removal and Replacement

Considerable skill is required to properly remove and apply the mouthpiece so that no metal can leak from between the joints after the job is completed. The novice should, if possible, engage some experienced machinist to do the work the first time. In this way he can see all the details and have the benefit of his observations. A great many of the smaller composing rooms prefer having an experienced machinist come in to do the work.

Certain preparations should be made before attempting the removal of a pot crucible mouthpiece. Sometimes unforeseen things arise to delay the work and these can be anticipated by being fully equipped with all the materials ahead of time.

These items include a three-pound hammer, a special drift, dross saw, extra mouthpiece and gib, a wedge-shaped block of wood, small quantity of abrasive powder or automobile valve-grinding compound, a specially prepared wooden grinding block, some Prussian blue or red lead powder, a six-inch pillar file, and a sixty or eighty-grit aloxite stone.

The three-pound hammer will have sufficient driving force to loose the mouthpiece quickly with a minimum number of blows; a light hammer will burr the end of the mouthpiece.

The special steel drift is shaped to fit the mouthpiece and the dross saw is used to clear out any oxide obstruction in the crucible throat.

While it is possible that either or both the old mouthpiece and gib may be returned to the crucible, new ones should be provided, especially in the case

of a machine that has been used a long time. Having them on hand is a matter of protection.

The wedge-shaped block is used to take up the jar from the hammer blows while loosening the mouthpiece, and is placed between the machine column and the crucible. This block measures approximately five inches in length, one and one-half inches at its upper end, tapering to about one inch at the smaller end.

The No. 120 abrasive powder is used to grind in the mouthpiece against the crucible lips.

The wood grinding block may be a piece of ordinary cherry furniture, having two brads projecting at either end, spaced about 24 ems apart. The projecting brads fit into the mouthpiece jet holes and the block is a useful means of handling the hot mouthpiece while grinding it to fit the crucible.

The Prussian blue or red lead powder is mixed with machine oil to a consistency of thick cream, being the medium used in taking transfer impressions of the mouthpiece and mold.

The work can now be commenced. In the first place, do not turn off the heat. This job is to be done while the metal is melted.

Run the machine ahead until the first elevator rests upon the vise cap and lower the vise to second position, depress the mold cam lever handle to disconnect the mold slide, disconnect and remove the ejector lever link, disengage the pot pump plunger, pull the mold slide forward or remove it from the machine, remove the left-hand vice locking stud on the mold gear arm so the drift can be held in line with the mouthpiece. Now drive the wooden wedge between the pot crucible and machine column. Mark the crucible and mouthpiece above the extreme right jet with a vertical score line. This is done so that when replacing the mouthpiece the end jets will come within the liners, and if application of a new mouthpiece is necessary, the mark on the crucible will locate it in the same position occupied by the old one. In any event, the mouthpiece applied to the crucible should be so placed that the end jets will come wholly within the mold-cell dimensions. An end jet half covered by the liner will cause imperfect letters to be cast on the slug which will have all appearances of cold shots.

Hold the drift against the left end of the mouthpiece and strike it smartly with the hammer. Wedge the gib with the tang of a file to prevent it moving with the mouthpiece. A few blows should move the mouthpiece toward the keyboard. Grasp the gib with a pair of pliers and withdraw toward the mold gear arm.

Any oxides in the crucible throat can now be broken down by vigorous use of the dross saw, afterwards placing a metal container or ingot mold pan under the crucible mouth to catch the loosened dross and metal when the plunger is operated by hand.

Use a wire brush to scour the crucible lips.

If the old mouthpiece and gib are in good enough condition to warrant replacement, scrape them thoroughly until bright and clean.

Place the mouthpiece over the brads in the grinding block and coat the mouthpiece with valve-grinding compound, or No. 120 emery powder mixed with machine oil. Hold the mouthpiece against its seat on the crucible lips, and by using one-half inch strokes back and forth, grind the two parts together. A new mouthpiece should also be ground in to fit the crucible lips. Now clean both mouthpiece and crucible free of all abrasive, and apply a thin coat of red lead and oil to the mouthpiece where it has contact with the crucible. Avoid placing red lead where the gib slides. Apply graphite and oil to the gib. Carefully slide the mouthpiece to position on the crucible without rubbing off the red lead cement. Insert the gib and drive it to place, watching to see that the mouthpiece does not shift its position from the alignment of the end jet with the mark previously made on the crucible before removing the old mouthpiece. Never bend the end of the gib over in attempting to drive it in, and stop driving when the hammer blows sound solid.

A transfer impression, using Prussian blue or red lead powder mixed with oil to a consistency resembling thick cream, can now be made to determine the parallelism of the mouthpiece in relation to the mold.

Packing the Metal Pot

If a gas heated metal pot is to be repacked, it is best to lift it out, although it is possible to do the job while the pot is in the machine.

Lower the vise to second position, remove the mold slide, pot lever and pump stop bracket; take off both pot leg caps; loosen the front pot leg adjusting screws; return pot lever shaft to place and tighten the set screw, remove the plunger, and loosen the pot cover screws. Dip as much metal as possible from the pot. A small spoon wired and bent at right angles to a wooden stick will be of assistance in dipping metal from the pot crucible well. Turn off the gas and disconnect the governor and burners. Take off the pot cover.

Removing the Pot.—Have someone assist in lifting the pot from the machine. The pot jacket and legs will not have cooled and removing it single-handed will be a rather awkward job. Pass a length of belting between the pot lever shaft and pot jacket to hold up the rear end of the pot while another person lifts the pot legs from the shaft bushings. Lower the pot at the rear by slipping the belting and rock the legs upward, passing the pot out over the vise. Any metal remaining in the crucible can be poured out by tilting the pot over the metal pan. Then set the pot on a box in an upright position, letting the legs rest upon the floor.

With a large screwdriver, loosen the asbestos packing from between the crucible and pot jacket. Invert the pot and tap the crucible loose with small pigs.

Crumble the asbestos packing into a pan and moisten with water. An extra quantity should be provided previous to doing the job, and this can be

mixed with old packing. Add as little water as possible to make a heavily-bodied mixture. If the paste is too thin, the cement will shrink and form air spaces when the heat is again applied to the crucible.

Stop the crucible well with a wadded cloth to prevent entrance of cement which might lodge in the crucible throat and cause defective slugs. Wet the inside of the jacket, using a sponge and water, also the outside of the crucible, which prevents the cast iron absorbing too much moisture from the cement before setting. Coat the inside of the jacket with a layer of the cement about half an inch in thickness, except the region in front where the burners are located. Set the crucible in place, and fill the spaces around the crucible with cement, tamping it tightly with a slender stick of wood, and see that the gas burners are not clogged with cement when this operation is finished.

Wipe off all parts and reassemble in reverse order from the procedure followed in dismantling the parts. Before the pot legs are set on the shaft, turn the bushing lugs straight up. The vertical adjusting screws rest in little cups on the lugs.

Some Causes of Back Squirts

Dirty pot pump plunger and crucible well. The plunger and well should be cleaned daily, or oftener, if necessary.

Too high a metal temperature. The metal temperature should be kept between 525 degrees and 550 degrees F.

Metal level too high. The metal level should not be higher than within one-half inch of the crucible rim.

Metal accumulation on the backs of the molds, due to neglected back mold wiper.

Misadjustment of the pot lever will cause back squirts, if the lever does not compress about ⅛" when the pot cam forces the pot against the mold.

Poor grade of metal. Also metal that has been robbed of its alloys by slovenly remelting methods and careless skimming.

A broken pot lever spring.

Cracked pot lever roller anti-friction rollers.

Pot leg adjusting screws have worked loose.

Warped mouthpiece or mold.

A vise locking stud has worked loose.

The left-hand liner has been shaved by the back trimming knife so that it is no longer .875" from front to back. A loosened condition of the liner can be caused by neglecting the ejector setting when changing to a narrow measure.

On a machine that has been in use for a long time, the pot lever spring may have lost its tension.

Chapter XVI

INTERTYPE ELECTRIC METAL POT

The Intertype Electric Pot may be considered as composed of two groups —the pot proper consisting of the jacket, crucible and cover, manufactured by the Intertype Corporation, and the heating equipment consisting of heating units, control panel and control thermostat, manufactured by the General Electric Co., Schenectady, N. Y.

The pot proper is, in general, like that furnished for gas heating, and needs no description, except to say that the spaces formerly occupied by the gas burners under the crucible throat are blocked off by covers and filled with heat insulating material.

The Heating Units are made of sheath wire, a product of the General Electric Company's research laboratories. This sheath wire consists of a nickel chromium resistance wire surrounded and protected by a special insulation of magnesium oxide, the whole being encased in a steel sheath or tube. The steel sheath enclosing the resistance wire and magnesium oxide is swaged to a somewhat smaller cross section after filling, thus making a dense rugged unit which is formed into shape for side and throat heaters. The steel sheath is calorized (alloyed with aluminum) so the sheath will not oxidize or waste away under continuous heating. There are three of these units, one on each side of the crucible and the third under the throat, which is so formed that the mouthpiece and throat are both heated by the same unit. All of these units slide freely into the pockets provided on the crucible, the ends or terminals being brought to a terminal box on the side of the pot where they are securely clamped and where the connections between units and the wires from the panel may be made. This terminal box is provided with a cover which should always be kept in place, since the terminals of the units are exposed and a short circuit is likely to occur if they are left unprotected.

The side units are the same for low (105-130) and high (205-270) voltage. When used for low (105-130) voltage they are connected in *parallel* or in *multiple;* when used for high (205-270) voltage they are connected in *series.*

They are marked:

1. P-1143-1146, which can be used on currents ranging from 105-115, also from 210-225 volts.
2. U-1144-1147, which can be used on currents ranging from 105-125, also from 220-245 volts.
3. U-1145-1148, which can be used on currents ranging from 110-135, also from 240-270 volts.

The throat unit is not universal. One throat unit is for 110 volts and another for 220 volts. Either may be used on direct or alternating current.

Opening and closing coils and rheostat are numbered as follows:

	110 volts D. C.	110 volts A. C.	220 volts D. C.	220 volts A. C.
Opening	92,869	94,176	323,709	92,976
Closing	320,968	320,971	320,969	320,972

The coils are furnished for use with A. C. current in 60, 40 or 25 cycles.

Rheostats, D. C. or A. C. 110 volts, 1,894,433.

Rheostats, D. C. or A. C. 220 volts, 1,696,008.

These parts are listed in the Intertype Parts and Supplies catalog.

Control System

In the control system for this pot it is intended that the throat unit regulated by the rheostat should supply enough heat to keep the throat and mouthpiece at the proper temperature, and that the heat for melting the metal and for keeping it at the proper temperature should be furnished by the two side units, being controlled by the thermostat. The operator should keep prominently in mind the fact that the two sources of heat are entirely independent of each other, and either may be controlled or adjusted without affecting the other.

Mouthpiece Control

The temperature of the metal is kept constant by the thermostat, while the temperature of the mouthpiece may be raised or lowered by means of the rheostat on the control panel.

The throat unit is in series with its rheostat and regulation of the temperature of the throat and mouthpiece is controlled by turning the knob of the rheostat.

First style rheostats *13*, Fig. 88, were marked with arrows. By turning in the direction of the arrow marked, "To Cut in Resistance," the heat of the throat and mouthpiece is reduced. By turning in the direction of the arrow marked, "To Cut Out Resistance," the heat is increased.

The present style rheostat, Fig. 93, is marked "High" and "Low." To regulate, turn the knob in the direction necessary.

When turning on the current to heat the metal to casting temperature, turn the rheostat handle all the way to high. When starting to cast, regulate the throat temperature by means of the rheostat until the proper condition is obtained for the size of the slug being cast.

The First Style Thermostat

The temperature produced by the side units is regulated by the thermostat which is located on top of the pot. This thermostat is adjusted to keep the temperature of the metal between 510 degrees and 530 degrees F.

An adjusting screw is located at the base of the thermostat with which heat can be raised or lowered, by turning toward "L" for less heat and toward "H" for more heat.

First Style Thermostat Temperature Adjustment.—The two terminals on top of the thermostat are connected so that turning this thermostat adjusting screw to the right raises the temperature, and turning to the left lowers the temperature.

The action of the thermostat is entirely automatic, and operating in conjunction with the relay on the control panel it will maintain the metal at a constant temperature. This is accomplished in the following manner: The stem, or that part of the thermostat which projects into the molten metal, is provided with an aluminum bar as its sensitive element. Aluminum having a high co-efficient of expansion is very sensitive to changes of temperature.

Operation of First Style Thermostat.—The thermostat body is provided with a pair of ball-bearing pivots near the base, and a pair of electric contacts at the top. The moving element, or lever, is pivoted on these bearings and is provided with contacts which align with those on the body, as well as a spring on one side, the pressure of which causes the lever contact to press against one of the stationary contacts. When the metal is hot, the free end of the aluminum bar above mentioned presses against the ball end of the adjusting screw which is threaded through the horizontal arm of the lever, this screw being slightly off the center line of the lever pivots. As the aluminum bar expands with the increase of temperature, the lever will be caused to rotate on its pivot through a small arc. This will overcome the pressure of the spring above referred to and the contact at the top of the lever will now move over against the other one of the pair of stationary contacts. As the metal in the pot slowly heats or cools, the contact on the lever will pass from one to the other of the stationary contacts of the body.

The ball point or lower end of the lever adjusting screw which has contact with the top of the expansion rod cap is of hardened steel, but in time it may become flat through friction with the cap. When this occurs the lever will not pass from the B to the A contact in the thermostat to shut off the flow of current to the pot units, and will likely stick midway between the two contacts, causing the metal to reach a high temperature. When this occurs, remove the adjusting screw and restore the ball point to the screw or apply a new one.

In the case of a number of early electric pot thermostats, there was provided a small eccentric wheel, against the edge of which the aluminum bar pressed, instead of the adjusting screw above referred to.

Maintenance of First Style Thermostat.—To remove the first style thermostat, disconnect the three wires from the body after turning the main line snap switch to the *Off* position. Turn out the four base screws and the two screws holding the body to the base. The body can now be lifted from the base and taken to a bench or table. The stem and lower plate may be left in position on the pot cover unless some attention is needed. Remove the contact and adjustment covers and take out the lever spring, unscrew the *C* terminal nut to release the small wire connected to the swinging lever. The

lever can be removed after taking out the front pivot screw. It is not necessary to remove the back one. Before removing the front pivot screw, set the thermostat body in an upright position on a flat surface so as not to lose the steel balls which form the pivots. These balls will be released when the pivot screw is turned out. The balls may now be cleaned by rubbing them between pieces of cloth and the conical seats in both lever and pivot screws should be cleaned. Rub the contacts with fine emery cloth if they appear to be burned. Apply stiff graphite grease to the pivot sockets in the lever and adjusting screws. Put each ball in place in each of the screws. The stiff graphite grease will hold the balls in place while reassembling the parts. Pass the lever into the body and start the *C* wire screw into its bushing at the side of the body; hold the lever in position on the back pivot adjusting screw ball and turn up the front pivot screw which has been returned to the body, until its ball enters the socket in the lever. Turn the front screw just enough to prevent the lever and balls falling out, and make sure the lever does not rub against the side of the body casting. Apply the fibre washer and nut to the *C* terminal. Put the lever spring in place and apply the adjustment cover. Return the thermostat body to place on the pot cover.

Adjusting the Pivots.—The pivots must not be tight enough to cause friction, and they must not be loose enough to cause lost motion, both of which are detrimental to proper operation. These pivot screws then must be so adjusted as to eliminate both friction and lost motion—to be tight and yet free.

This adjustment must be made while the thermostat is hot and the parts expanded, and may be accomplished as follows: Be sure that the front pivot screw is loose in order not to injure the pivots by excessive pressure when expanding. The object of this is to allow all parts of the thermostats to expand to the normal operating condition. After becoming thoroughly heated, the loose pivot screw may be screwed in and the check nut set up.

This is the delicate part of the operation, and should be done with great care, in order to eliminate both friction and lost motion as above explained. Friction may be detected by moving the lever with a pencil by light touches, in the direction of its motion. Lost motion may be detected by first turning off the line switch, then grasp the lever at the top near the contacts with the thumb and second finger, and move it at right angles to its direction of motion. After a few trials the operator will develop a sense of touch which will enable him to make this adjustment very accurately in a minute or two. *This adjustment must always be made while the pot is hot, on account of the expansion of the parts.*

While doing this, care should be taken that the temperature screw be screwed out sufficiently so that the spring will hold the swinging lever or *C* contact against the *B* contact, so there will be plenty of room to allow for expansion of the aluminum rod. By means of a screwdriver, turn the temperature adjusting screw clockwise until the screw comes in contact with the

end of the aluminum bar, which will be indicated by the thermostat throwing the relay open. Place a thermometer in the pot, the bulb near the aluminum rod, and read the temperature several times when the relay opens and when it closes. This will give the range across which the thermometer operates, and a check of the accuracy of the setting of the pivot screws. The total range from on to off need not exceed 15 degrees Fahrenheit.

If too high or too low, the temperature may be lowered or raised by the adjusting screw to the proper value. Always keep the covers in place on the thermostat, as they are furnished in order to keep out dust and foreign matter, which, if allowed to collect, will interfere with the operation of the thermostat.

Note that there are two flat springs attached to the bottom of the baseplate. These are provided in order to give flexibility when the pot cools. When the metal freezes, it grips the stem of the thermostat, and when further cooling and contraction of the stem occurs, it would raise the temperature setting very slightly from day to day, and in time the thermostat would be found to be seriously out of adjustment. The springs are provided to take up the contraction and to avoid strains on the sensitive element of the thermostat.

New Style Thermostat

Operation of New Style Thermostat.—The new style thermostat is shown in perspective view, Fig. 86. Its operation is exactly similar to the first style device. The moving contact lever *11*, connected to the *C* wire terminal by the flexible wire *10* is caused to move between the contact screw *13* in the *A* wire terminal, and the contact screw *12* in the *B* terminal through action of compound leverage when the expansion rod *4* contracts or expands with the slightest change in metal temperature, causing the expansion rod cap *2* to bear against or recede from the operating lever *1*. When the expansion rod *4* lengthens as the metal temperature is increased, the cap *2* is caused to bear against the operating lever *1*, pivoted on the bearing pin *3*; the operating lever *1* pushes against the temperature adjusting screw 7 in the contact lever *11* pivoted on a stud at *5*, so that the contact in the lower end of the lever *11* will touch the contact screw *13* in the *A* wire terminal, opening the relay in the control box and the current will cease to flow through the heating units at either side of the crucible. As the rod *4* contracts or shortens in length when the metal cools, the pressure of the rod cap *2* is released from the operating lever *1*, and the swinging lever *11* is caused to follow the receding movement of the operating lever *1* by the spring *8*, mounted back of the lever *11* on a stud *5* as the operating lever *1* permits. When the rod *4* has contracted sufficiently, the contact in the lower end of the lever *11* will touch the contact screw *12* in the *B* wire terminal, which will cause the relay operating coil in the control box to become energized, closing the relay so that current may flow through the side heating elements.

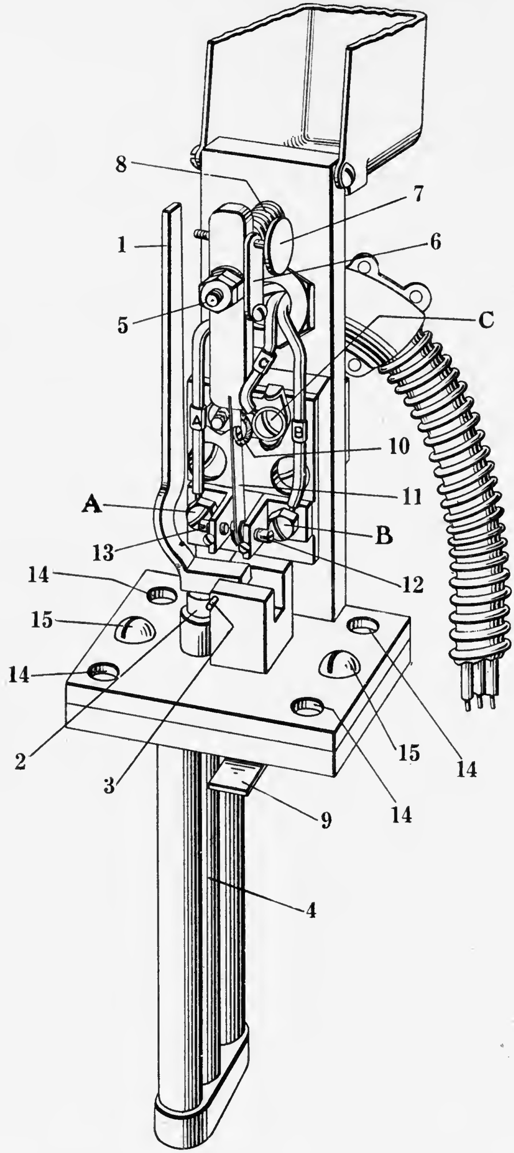


FIG. 86.—New Style Electric Pot Thermostat. This thermostat is positioned upon the pot cover and the lower part of the aluminum bar *4* is immersed in the molten metal. When the metal temperature is raised by the electric current flowing through the heating units, the bar *4* extends or increases in length, which causes the cap *2* on the bar to bear against the operating lever *1*

pivoted at *3*. The operating lever *1* moves over and bears against the adjusting screw *7* in the swinging lever *11*, pivoted on the stud *5*. This causes the round contact in the lower end of the swinging lever *11* to touch the *A* contact *13*, causing the current to cease flowing through the crucible heating units because the switch in the control box will be opened, breaking the flow of current to the units. When the metal has cooled sufficiently (generally about 10 degrees) the aluminum bar will have contracted to permit the operating lever *1* to recede from the adjusting screw *7* in the swinging lever *11*. The spring *8* will cause the swinging lever *11* to move toward the *B* contact at *12*. This action of the lever *11* moving toward and touching contact *12* energizes the magnetic coil in the control box and the switch is closed, permitting the current to flow through the crucible heating units to raise the temperature of the metal.

Adjustment of the New Style Thermostat for metal temperature is made by the adjusting screw 7. Turning the screw clockwise will lower the heat of the metal, and turning it counterclockwise will raise the heat.

The plate *6* holds the position of adjusting screw *7* stationary through spring pressure.

The spring *8* causes the movable contact lever *11* to follow the receding movement of the operating lever *1*, and also steadies the contact lever *11* against vibrations caused by movements of the metal pot.

The contact screws *12* and *13* are so adjusted that there is 1/32″ space between the swinging lever contact and one contact screw when the lever contact is touching a contact screw. Keep the contact screw jam screws drawn up snugly. Occasionally, pass abrasive cloth of fine grain between the lever contacts and the contact screws.

The spring *9* is a means of holding the thermostat to the pot against its four base-fastening screws *14* with yielding pressure, so that when the metal is frozen solid, the aluminum bar *4* will not be gripped to such an extent that the temperature adjustment of the thermostat will be destroyed.

There is a small bushing on the contact lever pivot *5*, between the stud and the contact lever, and a trifle wider than the lever. This limits the distance the nuts can be turned against the contact lever *11* so it will have freedom of movement.

Make sure that the three thermostat cable wires, *A, B* and *C* do not interfere with the normal movements of levers *1* or *11*. Tuck them out of the way.

Removal of New Style Thermostat.—In order to remove the thermostat from the pot when the metal is frozen, disconnect the three *A, B* and *C* wires; take out the two screws *15*, and the four screws *14*. Remove the thermostat body from its base plate; then take out the two flat-head screws which hold the base plate to the expansion rod stem rods and lift off the plate. This will leave the stem frozen in the metal, and the pot cover may be taken off after its fastening screws, the plunger and the pump stop have been disconnected preparatory to the replacement of a side heating unit.

Occasionally, inspect the new style thermostat to see that all screws are tight and that the operating and contact levers are free on their pivots.

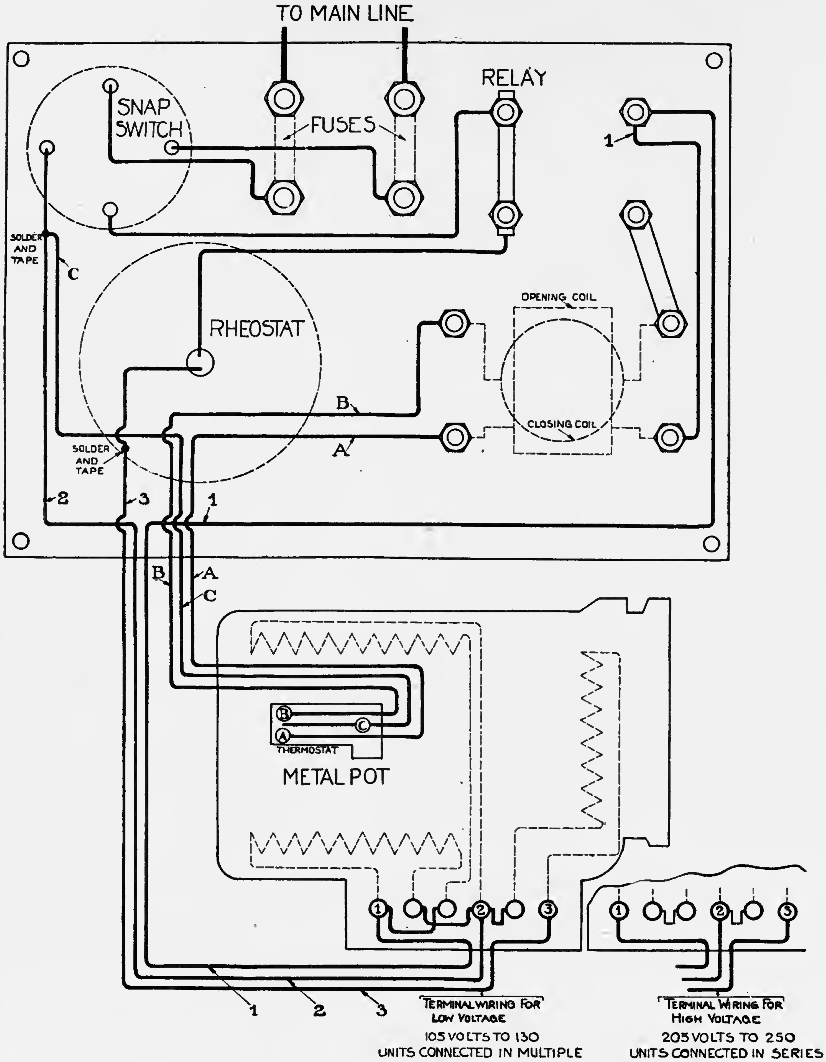


FIG. 87.—First Style Electric Pot Wiring Diagram, showing the terminal connections by means of bridges or "jumpers" for high and low line voltage.

First Style Control Relay

The first style relay on the control panel, Fig. 88, is provided with a vertical arm, hinged at the bottom, with a contact plate at the top, and a magnet coil at the middle. This arm is further provided with a latch, and when the magnet coil is energized the arm is pulled in, pressing the contact plate

against two studs, the plate completing the circuit from one stud to the other. The latch being operated by gravity, holds the arm in this position which may be called the closed position and the coil just referred to may be called the closing coil. When the relay is in this closed position the heat is on the two side units. The relay is also provided with another coil having its axis vertical, which has a movable core. Whenever this coil is energized its core is lifted, and trips the latch above referred to, allowing the relay to open. This may be called the opening coil.

Combined Action of First Style Thermostat and Relay.—Both of these coils are connected to the contacts on the thermostat body and when alternately energized will alternately close or open the relay and put heat on or off the side units, the coils being energized by the contact of the lever of the thermostat, moving from one to the other of the stationary contacts on the body, as the metal heats or cools as previously described, deriving its action from the expansion and contraction of the aluminum bar which projects into the molten metal.

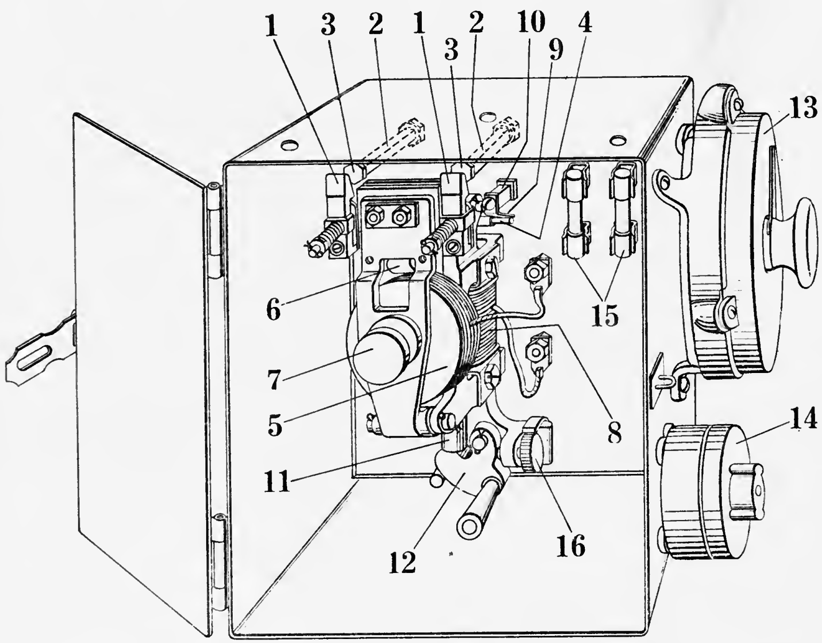


FIG. 88.—First Style Electric Pot Control Box. The fuses are indicated at *15*; the switch *14* and the rheostat *13* for mouthpiece heat regulation are mounted outside the box. The relay switch arm *7* is caused to open when the opening coil *8* is energized and closes when the closing coil *5* is energized by action of the thermostat mounted upon the pot cover. These coils only carry current momentarily. The action of the switch opening or closing breaks the current flowing through the coils.

The panel is provided also with a snap switch in the electric power line, which indicates whether the heat is on or off the pot. When this switch is turned on current flows through the throat unit, which is connected directly to the snap switch, and is not affected in any way by the position of the relay. The throat unit is controlled by the rheostat and the side units are controlled by the combined action of the thermostat and relay, each of the two sources of heat being entirely independent of the other.

It should also be mentioned that the contacts on the thermostat *make* current through the relay coils only, and the instant either coil is energized the relay will throw (being provided with contacts for the purpose), and when thrown it breaks the current in the coil which caused it to throw, thus the thermostat contacts *make* only, the current being broken at the relay itself. These coils are not designed to carry current continuously, and will overheat and burn out if not properly connected.

The wires leading to the heating units and thermostat are tagged for ready identification to facilitate making connections. A diagram of connections is also furnished and may be found pasted to the inside of the control box cover. It should be carefully followed when making connections to the thermostat and units.

First Style Relay.—Make sure that the main contact fingers *1*, Fig. 88, and tips *3*, of the first style relay, are clean and in good condition. Clean the contacts with fine abrasive cloth. See that both fingers make contact with both contact posts at the same instant. If they do not make contact at the same time, adjust the contact posts *2*, moving them in or out with respect to the slate base until the proper position is obtained. To do this it will be necessary to remove or loosen the nuts at the back of the slate base.

The proper position for the posts *2*, is when the space between them and the fingers, *1* and *1*, is 9/16″ when the relay is open. As the tips on the posts *2* and the fingers *1* wear, due to continued operation, the distance of 9/16″ between them will gradually increase. If trouble occurs from this cause, the parts should be adjusted or renewed to maintain this distance as near as possible to 9/16″ from face to face.

Closing Coil Contact Spring Adjustment.—The closing coil contact post springs, one of which is shown at *9*, attached to post *10*, may also need occasional adjustment. These springs press on the ends of the relay contact arm stud *4* when the relay is open, and are used to complete the cricuit through the closing coil *5*. They bear on the stud *4* while the relay is open and should continue to bear on the stud *4* during the act of closing until the relay has actually latched, and the end of the arm *6*, bearing on the arm stud *4* has dropped to its new position, when the stud will drop away from the closing coil contact post springs *9*. In this position a gap of 3/16″ approximately should exist between the springs *9* and the stud *4*. If this gap is greater or less than approximately 3/16″ the springs should be bent to the proper position.

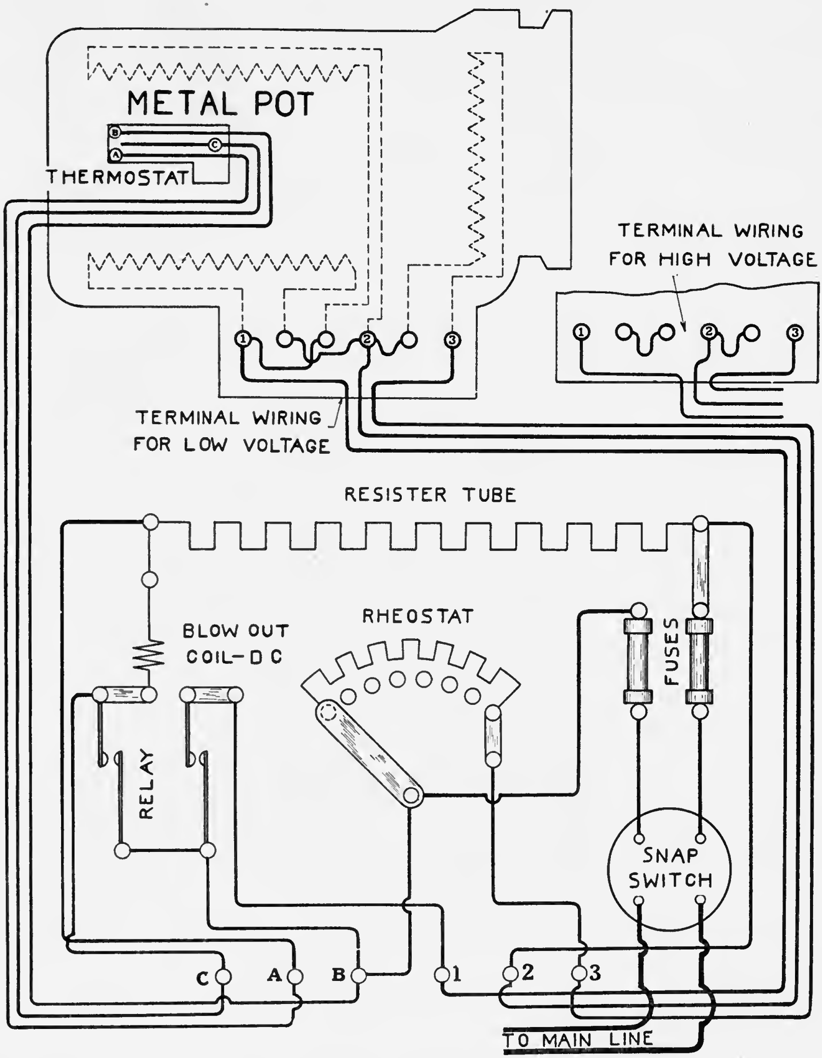


FIG. 89.—New Style Electric Pot Wiring Diagram, showing the terminal wiring for high and low voltages. The heating units are connected in series for high voltage and in multiple for low voltage. The same heating units for the crucible are used for both high and low voltages, but the method of connecting them is different. A different throat heating unit is used for high and low voltage.

Care should be taken to see that the relay contact arm *6* falls and moves freely on its shaft, and that there is no sticking or sluggishness in the movement of either the catch plate or the arm.

It is absolutely imperative that the contact arm stud *6* should drop clear of the closing coil contact post springs *9* when the relay is closed, otherwise the closing coil *5* will continue to carry current, which will burn out the coil in a short time.

To make sure that the thermostat and relay are in proper working order with respect to each other, remove the thermostat contact cover and operate the thermostat lever by hand with a piece of wood or a pencil, to open and close the relay a number of times. In this way its operation can be carefully observed. If either of the relay coils should be burned out, it would be impossible to operate the relay from the thermostat, although a loose connection or a broken wire would give the same effect.

To test the relay coils, *5* and *8*, remove the leads from the brass terminal studs, and by means of the lamp-and-cord test lamp, test each coil by holding each end of the test wires on the terminals. These coils are of high resistance, and it may be that in some cases the lamp may glow very faintly.

If the pot overheats, test the swinging lever which is in the thermostat to see that the small thin magnet wire is not short circuited, as this wire should connect the lever to the lower or *C* terminal on the back of the thermostat. This circuit leads directly to and energizes the opening coil *8* which causes the core *11* to strike the tripping lever *6* and open the relay switch arm *7*, so that the contacts *1* and *1* will be released from the pole pieces *3* and *3*.

The calibrating cam *12* is adjusted to position the core *11* in relation to the tripping lever *6* so that when the opening coil *8* is energized, the core will strike the lever with more or less force. When properly set, the adjustment will last indefinitely.

New Style Control Panel

The control panel now applied to Intertype machines is designed for controlling, in conjunction with the thermostat, the temperature of the metal in the pot crucible, and consists of a control box in which is mounted:

1. A double pole indicating snap switch for connecting and disconnecting all the heaters in the pot, including the throat heater. When the switch indicates *"On,"* current will flow through the throat unit and adjustable rheostat which are connected directly to the fuses and are not affected in any way by the position of the relay.

2. A rheostat for adjusting the temperature of the metal pot throat, the manipulation of which in no way affects the temperature of the metal in the pot crucible.

3. A relay and resistor combination actuated by the thermostat for connecting and disconnecting the side heating units as the temperature rises and falls.

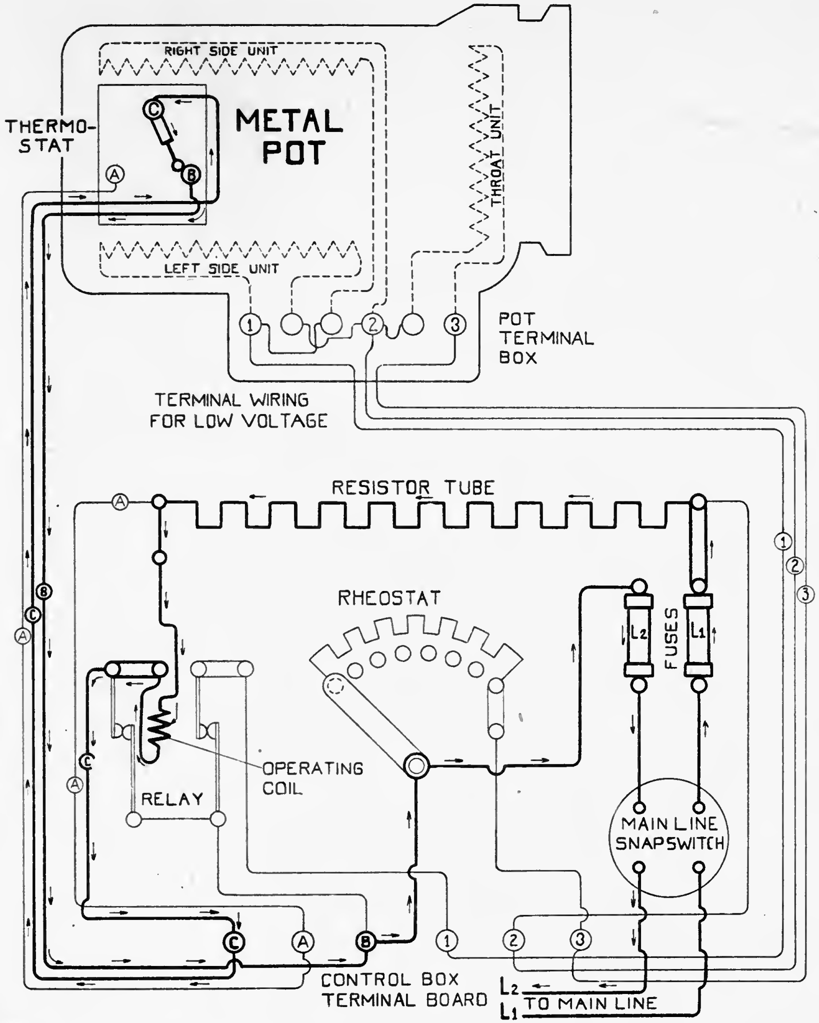


FIG. 89a.—Thermostat-Relay Closing Circuit. When the metal in the pot crucible cools, the aluminum bar *4*, Fig. 86, will contract and become shorter. As the bar shortens, the swinging lever or *C* contact in the thermostat swings over on its pivot, as permitted by the bar, to touch the *B* or stationary contact.

In this diagram the completion of the relay closing circuit (indicated by the heavy lines) magnetizes the operating coil to close the relay so the side heating units can start raising the metal temperature.

For explanatory purposes, it is stated that the current enters at *L1*, passing through one side of the main line snap switch and the fuse *L1*. As soon as the swinging lever or *C* contact in the thermostat touches the *B* or stationary contact the thermostat-relay closing circuit will be complete and current will start flowing (as indicated by the arrows) through the resistor tube, down to the

operating coil, through the *C* wire to the thermostat, from which point it will flow by means of the *B* wire to the *B* terminal in the terminal board at the front of the control box. From the *B* terminal the current will pass into the wire leading from the *B* terminal into the fuse *L2* and out the line wire *L2*.

The wire leading from the *B* terminal on the control box terminal board is tied in to one side of the rheostat which controls the throat circuit, but this connection in no way affects the closing circuit which energizes the operating coil.

As soon as the relay has been closed by the action of the operating coil becoming energized, current will start flowing through the side heating units to raise the temperature of the metal in the crucible.

Operation of A. C. and D. C. Relays.—The mechanical part of the alternating and direct current relays are different, but the principle of operation is the same. It will be noted that the resistor tube which is enclosed in a cage at the top of the control box is connected in series with the relay operating coil. When the moving lever or contact *C* and the stationary contact *B* in the thermostat are touching, the circuit from one side of the fuses to the other is completed through the *resistor tube, relay operating coil* and *thermostat,* causing the relay to close and connect the side heating units to the main line. As soon as the relay closes, provision is made to keep it closed while the swinging lever or *C* contact in the thermostat moves to make contact at *A*. This is accomplished in the D. C. equipment by adding an extra finger *19,* Fig. 91, at the front side of the relay, the purpose of which is to establish a permanent connection between the *C* and *B* contacts in the thermostat when the relay is closed during the time the swinging lever or *C* contact is moving toward the *A* contact. As soon as the temperature of the metal in the pot crucible reaches the maximum degree of heat and a connection is made between the *C* and *A* contacts in the thermostat, a by-pass circuit is made across the relay operating coil which by-passes most of the electric current which was passing through the relay coil before this circuit was established, and allows the relay switch *17* to open and remain open until contact is again made in the thermostat by the moving lever *C* touching the stationary contact *B*.

Operation and Maintenance

A. C. and D. C. Relays.—Do not wait until trouble occurs, but inspect all parts at regular intervals (at least once a week). The sealing surfaces between the movable and stationary part of the relay laminated field *24*, Fig. 92, for the A. C. relay, and the relay armature *4*, and the frame *5*, Fig. 91, of the D. C. relay should be kept clean and free from dirt or grease, otherwise the relay, when once closed, might fail to open properly.

With the power off, occasionally work the relay by hand to see that the moving parts operate freely without binding.

Examine the wiring of both panel and resistor, to see that the connections are all tight and that none of the parts are broken or bent.

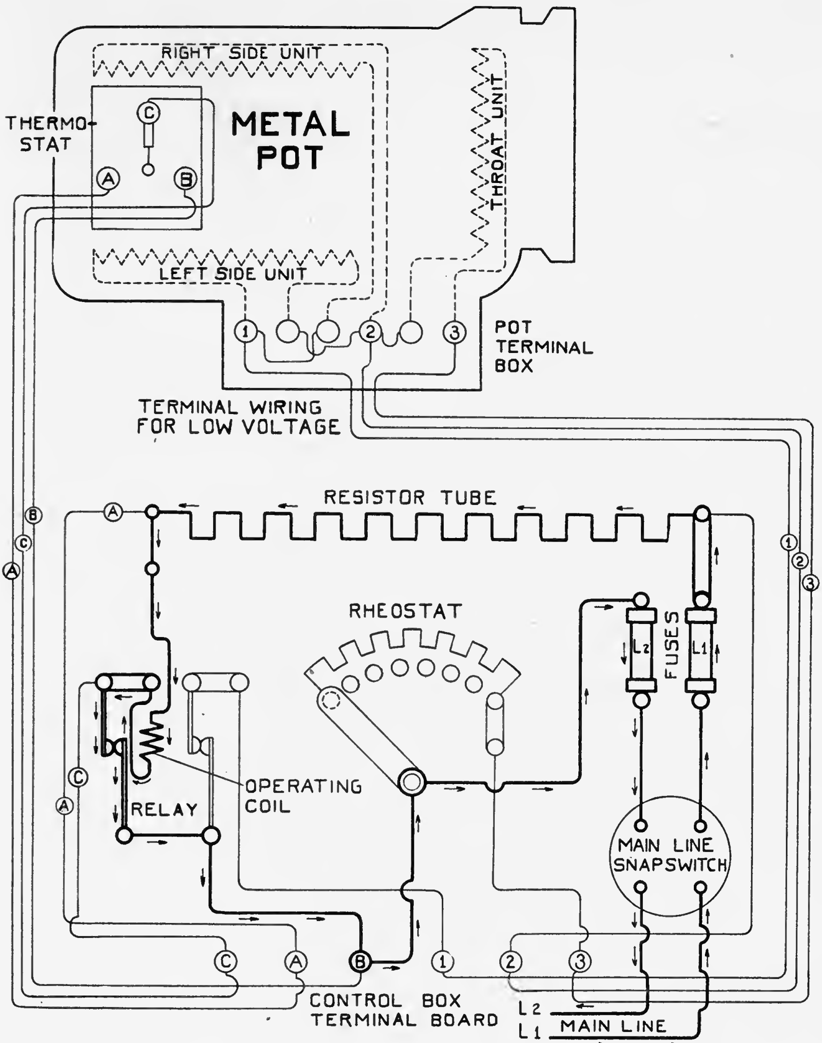


FIG. 89b.—Thermostat-Relay Maintaining Circuit. In Fig. 89a, the circuit which closes the relay is explained. When this circuit is completed by the action of the swinging lever or *C* contact touching the *B* or stationary contact in the thermostat, the relay closes, and current flows through the side heating units.

As the temperature of the metal in the crucible rises, the aluminum bar *4*, Fig. 86, which extends from the thermostat body into the molten metal, expands and causes the swinging lever *C* to move away from the *B* contact. This breaks the original or relay closing circuit explained in Fig. 89a.

The act of closing the relay by means of the operating coil, when *C*

touches *B*, establishes what is called a maintaining circuit, so that when *C* moves away from *B* the relay will remain closed until *C* touches *A* to open the relay.

Following the path of the current, indicated by the heavy lines and arrowheads, commencing at *L1*, it will be seen that no current is flowing through the *C* or *B* wires. The maintaining circuit established when the relay was closed permits the current to flow from *L1* through the resistor tube, into the operating coil (which holds the relay closed), down one side of the relay to the *B* terminal on the control box terminal board, and from there to the fuse *L2*, passing out into the line *L2*.

New Style Direct Current Relay

Care of New Style D. C. Relay.—The following special points should be observed in taking care of the D. C. relays. To examine or renew the main contacts *17* and *7*, Fig. 91, first remove the arc chute *8*. This can be easily removed by pulling out horizontally. If necessary, slightly loosen the screw *9* in the frame and be sure it is thoroughly tightened after the arc chute *8* is replaced. If the contact tips *17* and *7* are badly burned or worn down, it will be necessary to renew them. The contact piece *7* has an inset silver contact plate and the stationary block is plated with cadmium to prevent oxidation from exposure to the air. The finger *17* on the relay is also plated with cadmium for the same reason. To renew the moving tip or finger *17*, pull the cotter pin holding the cup washer *10* and unfasten the shunt, *12*. To remove the stationary contact piece *7*, turn out the screw *9* which extends through it and the frame.

In replacing these parts, care should be taken to see that all screws are tight with lock washers under their heads, and that all clamped contact surfaces required to carry current are clean. A piece of fine emery cloth or an extremely fine file passed over these parts before assembling will insure clean and bright surfaces that will make good contact.

The Blowout Coil.—A blowout coil *16*, Fig. 91, is used on direct current relay switches to take up the arc or flame caused by the breaking open of the finger *17* from the block *7*, which when closed in contact with each other permit current to flow through the side heating units. As the *C* contact or moving lever touches the *A* terminal in the thermostat, current ceases to flow through the magnetic operating coil *15*, which releases the armature *4* through pressure of a spring *18*, causing the finger *17* to separate from the stationary contact *7*. It is during this action that the blowout coil does its work in killing the arc that would be caused by separation of the finger and block, by preventing pitted and burned contact pieces.

Contact Spring Renewal.—If the contact finger spring *11* has become annealed or weakened, it should be renewed. This spring should be strong enough for the movable contact tip *17* to exert approximately two pounds pressure against the stationary block *7* when the armature *4* is closed as far as it will go.

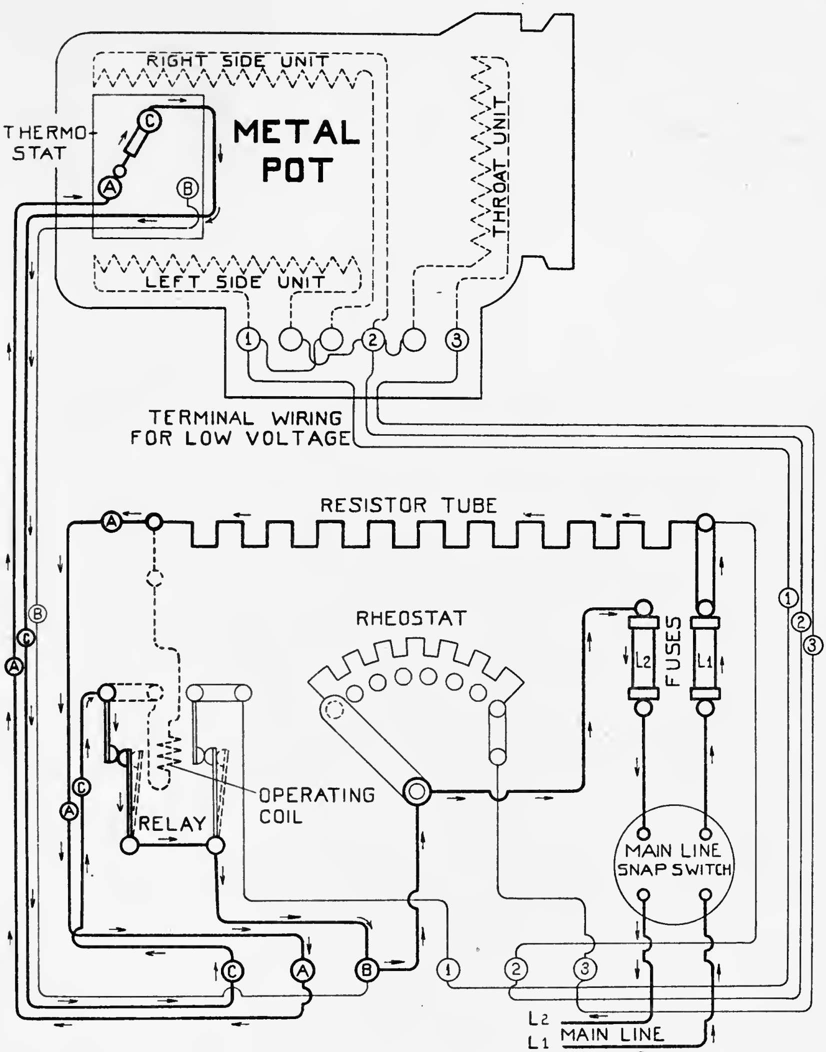


FIG. 89c.—Thermostat-Relay Opening Circuit. The maintaining circuit which was established (explained in Fig. 89b) has caused the relay to be held in a closed position and the side heating units have raised the temperature of the metal in the pot crucible to the proper degree of heat. As the heat of the metal rises the aluminum bar *4*, Fig. 86, has gradually lengthened or expanded, which in turn causes the swinging lever or *C* contact in the thermostat to swing over and touch the *A* or stationary contact, and the relay armature will be permitted to fall to the open position because the current flowing through the operating coil will be by-passed through one side of the relay.

The diagram shows the flow of current at the instant the by-pass circuit is completed by the action of *C* touching *A* in the thermostat.

When the opening circuit is completed its existence is of extremely brief duration, but its effect in de-energizing the operating coil is instantaneous. As soon as the relay contact tips have separated (indicated by the dotted lines) the opening circuit is broken and no current passes through the *A*, *B* or *C* wires until *C* again contacts with *B*, when the closing circuit will function to close the relay.

The current that was flowing from the resistor coil to the operating coil (indicated by the dotted lines) through the relay, is now diverted around the operating coil by entering the *A* wire, and is returned or by-passed through one side of the relay. The *A* wire at the instant of the contact of *C* with *A*, becomes positive. Electricity flows first along the path of least resistance. The path of least resistance is through the *A* wire, because of the resistance set up by the operating coil.

The current enters at *L1*, passes into the resistor tube, then by means of the *A* wire it goes to the thermostat and is returned (as indicated by the heavy lines and arrowheads) to the relay; it passes through one side of the relay to the *B* terminal board and from there into the fuse *L2* and out into the line *L2*.

The auxiliary contact post can be adjusted by loosening the lock nut and screwing the contact post *13* backwards or forwards so that the contact spring *14* will make contact with the post *13* a little in advance of the main tips, *17* and 7. The contact spring *14* touches the post *13* when the relay is closed, to furnish a maintaining circuit so the operating coil *15* will continue to hold the relay switch in a closed position while the thermostat lever or *C* contact is moving away from the stationary *B* contact toward the *A* contact.

If it is necessary to remove the operating coil *15*, pull the cotter pin and remove the spring that holds the armature *4* open, and take out the screw in the end of the core, taking care not to lose the thin copper spacer between the end washer and the core. When replacing the armature, take care that the spring tension on the armature is not increased over its original value.

This spring is originally adjusted so that the armature will pick up and close at approximately 75 per cent normal voltage when the coil is hot.

New Style A. C. Relay

The new style alternating current control switch is of the magnetic type. The switch is mounted upon a square shaft *15*, Fig. 92, pivoted in the brackets *16* and *17*, fastened to the back board of the panel. When the magnet is energized, the armature *24* closes against the pole in a coil *11* directly opposite, causing the two fingers *23* to close in against the contact posts *8*.

An armature stop *12* limits the open position of the armature *24*, and the contact fingers *23*. It should not be bent or otherwise shifted in position and its original setting must be preserved.

At regular intervals inspect the contacting spots of the fingers *23* and the posts *8* and keep them bright with fine sandpaper.

Care of A. C. Relays.—The following special points should be observed in taking care of alternating current relays:

To renew the contact tips *23*, Fig. 92, pull the cotter pin holding the cup washer *25* and the spring *4*. Also remove the shunt *5*.

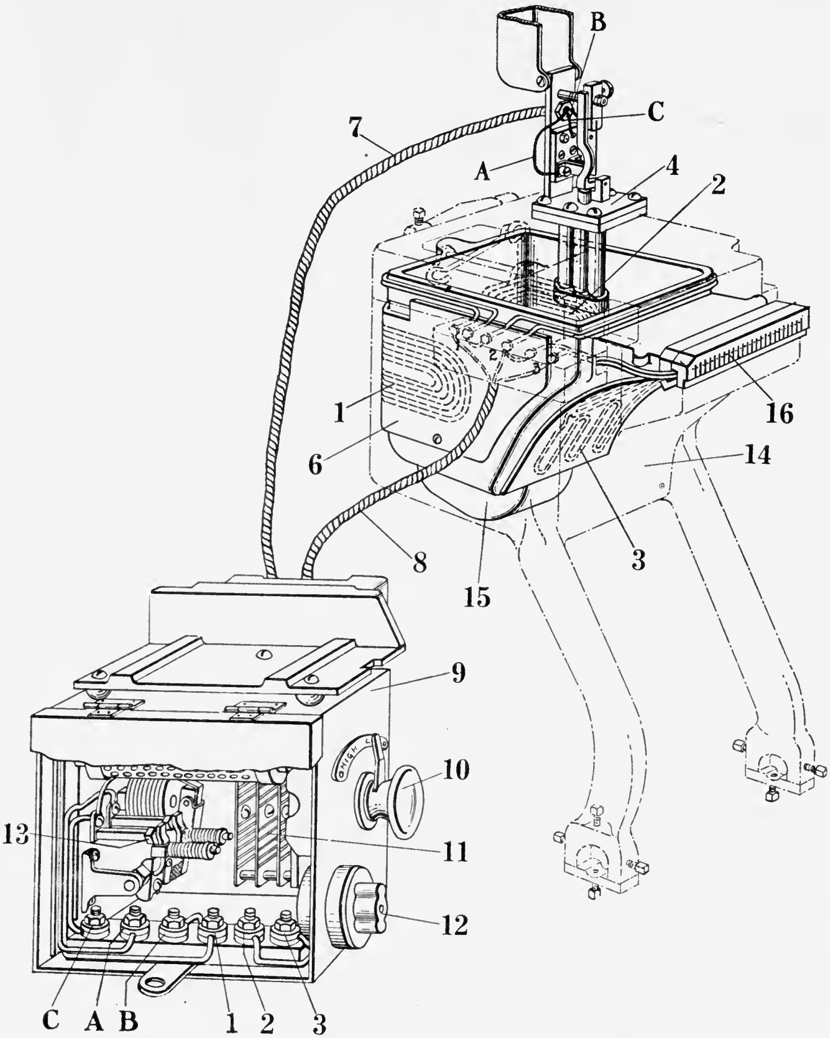


FIG. 90.—New Style Electric Pot Control. The thermostat *4* is mounted upon the pot cover, and the control box is affixed to the machine base at the left side of the metal pot. The heating units *1*, *2* and *3* are shown in position by the dotted lines surrounding the crucible *15*. The wires *1*, *2* and *3*, connected to the heating units, and contained within the cable *8* lead directly from the terminal box at the side of the pot *14* to very accessible terminals at the front of the control box *9*. The wires contained within the cable *7*, connected to the thermostat *A*, *B* and *C* binding posts, also have conveniently located terminals *C*, *A* and *B* at the front of the control box. The knob *10*, mounted outside the control box, cuts the resistance in or out of the resistors *11* inside the control box *9* to supply more or less current for the heating

unit *3* under the throat of the crucible. The throat circuit is entirely separate from the side unit circuit, and the operation of the thermostat in no way affects the throat heating circuit.

In replacing these parts care should be taken to see that the contact surfaces of the shunt *5* and the tips *23* are clean and that the screw *6* with lock washer *7* is turned up tight.

If the relay contact finger spring *4* has become annealed or weakened, it should be renewed. These springs should be strong enough to exert approximately one-half pound pressure against the stationary tips *8* when the armature *9* is closed as far as it will go.

After replacing the tips *23* with the relay in open position, the space between the stationary and moveable contact tips, *23* and *8*, should be one-quarter inch.

To make sure that the contact tip *23* is properly seated against its opposite contact, pull the tip back and forth by hand and see that it moves freely and does not bind. If it does bind, in all probability the projection at the lower end of the tip *23* binds in the hole of the tip support *10* into which it fits.

To remove the operating coil *11*, first take the relay from the control box, then remove the screw at the top of the magnet directly behind the coil, taking care not to lose the lock-washer and spring which holds the coil in position. Now pull out the armature stop *12*, when the coil *11* can be slipped from the magnet after disconnecting the coil leads.

Slight Humming Noise a Natural Condition.—Alternating current alternates or vibrates at the rate of 120 vibrations per second. The current passing through the coil causes the magnet to hold the armature *9*, Fig. 92, against the poles at the rate of 120 vibrations per second. There may be a slight humming noise in the switch due to these vibrations, which will be a natural condition. Possibly the armature will only have .001" movement against the pole faces of the magnet. Inspect the faces of both armature and magnet periodically and, if dirty, clean them with fine sandpaper.

The Relay Lamination Field or finger *24*, Fig. 92, is held very loosely in the armature *9* by two pins *18* and *19* so that it is free to move slightly as far as the pins will permit. The lamination field or finger *24*, when closed, has contact at its upper end with a pole face in the center of the coil *11*, and another pole *20* at its lower end. The lower pole *20* and the upper one in the center of the coil *11* are caused to close the lamination field *24* by magnetic force as the coil *11* is energized when the thermostat *C* lever contact touches the *B* terminal contact.

The Pole Shader.—In the detail drawing, Fig. 92a, are shown the upper and lower pole faces, the upper one of which has an inset copper band *22*, called a pole shader. If a pole shader becomes disconnected or broken from its groove in the laminated pole, the pole contacts *20* and *21* and the armature will become hot.

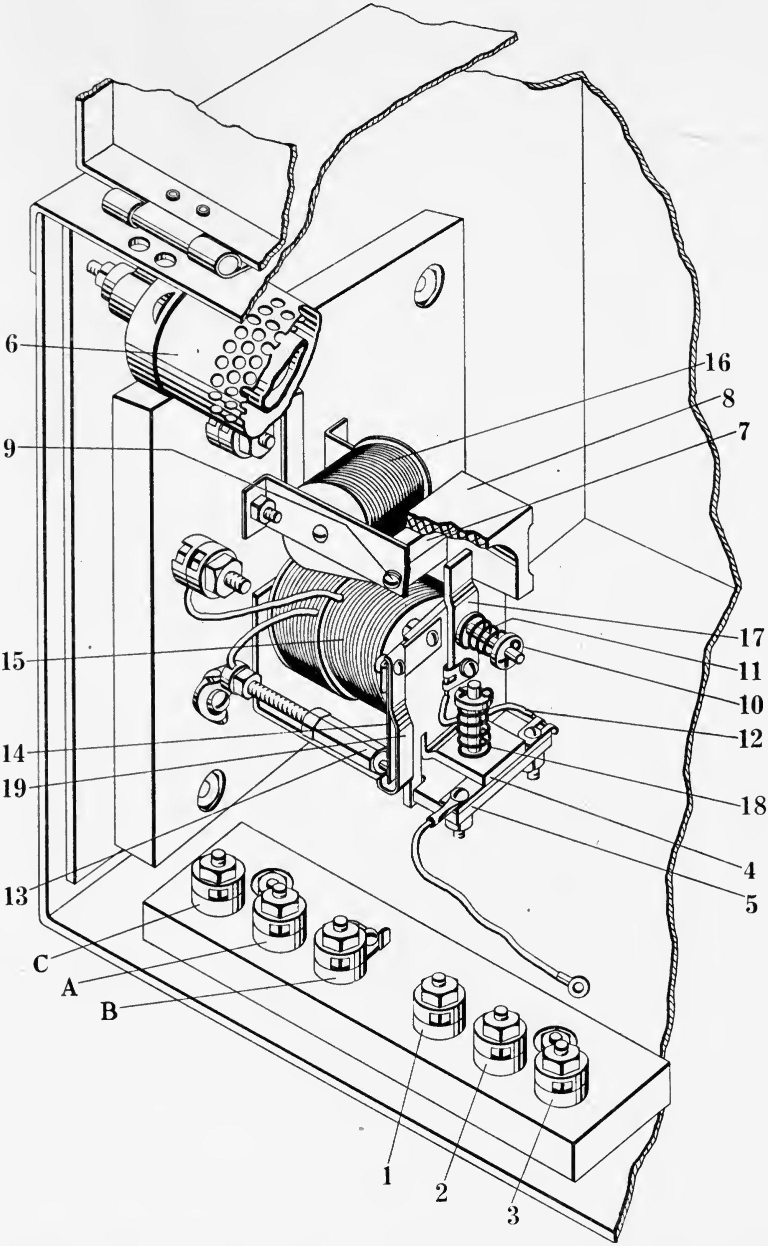


FIG. 91.—Direct Current Control. This is the relay used on direct current electric metal pot equipments. The resistor tube is indicated at *6*, the operating coil at *15*, the blow-out coil at *16*. When the operating coil *15* is ener-

gized, the armature *5* will close in against the coil *15* and the contact *17* will touch the contact block *7*. Current will flow through the side heating units to raise the temperature of the metal in the pot crucible. The purpose of the finger *19* is to establish a permanent connection between the *C* and *B* circuits through one side of the switch so that the operating coil *15* will hold the relay closed while the swinging lever or *C* contact in the thermostat is traveling over to touch *A* when the relay will be opened, shutting off the flow of current to the side heating units.

The Switch Hums Excessively.—On A. C. equipments, when the armature closes against the pole faces and a shader band projects beyond the contact end of a pole, keeping them from making a good contact, the switch will make an excessive humming noise. This excessive humming noise will also occur when dirt collects between the contact faces of the poles and the armature. It is also well to see that the armature *9*, Fig. 92, is loose in its cradle *13* and touches both the upper and lower pole faces when closed.

New Style A. C. and D. C. Rheostat

If trouble develops in the rheostat, due either to a burn-out or an open circuit, and it becomes necessary to replace any of the individual units, the complete rheostat should be removed from the control box.

Removal of the Rheostat.—Disconnect the three insulated wires leading to the rheostat at *B* and the three terminals at the top of the fuse as shown in the new style wiring diagram, pasted in the control box lid. Unscrew the four cap screws, nuts and washers *1*, Fig. 93. The rheostat can now be removed from the control box for inspection or replacement of any part.

After removing the rheostat, examine each rheostat unit carefully to locate a break in the resistor ribbon, or a loose tap nut and screw; also examine all of the wire connectors to see that none are broken, or touch one another.

Replacing Rheostat Units.—Any rheostat unit with a broken resistor must be replaced with a new one having the same U number as the broken one. There should be no trouble in replacing a unit. Remove the rheostat unit studs and nuts and any necessary tap wires. Remove defective units and replace with new ones.

In making replacement, particular care should be taken to replace all connecting wires without touching one another as they were before disconnecting them and that all tap nuts and screws are tight.

Testing the Rheostat.—Before replacing the rheostat in the control box, connect a test lamp in series with the rheostat to determine whether or not all connections and units are as they should be. With the test lamp connected as above, move the rheostat arm *4*, Fig. 93, back and forth by means of the knob *10*. If the lamp fails to remain lighted on any contact button (one of which is shown at *3*), either the connecting wire or resistor unit (one of which is indicated at *2*), is broken or the connecting screws and nuts are not tight. If the lamp remains lighted on all buttons, and you are satisfied that

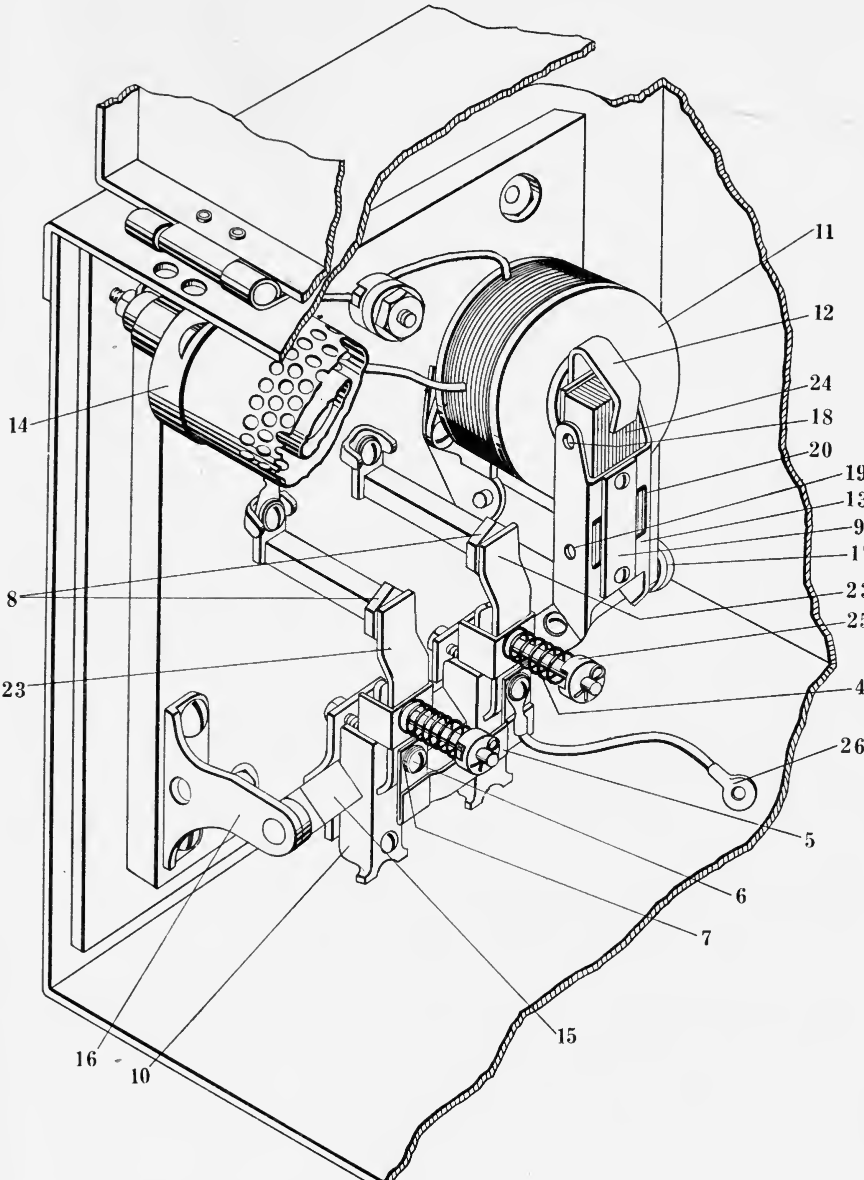


FIG. 92.—Alternating Current Control. This is the relay used on alternating current electric metal pot equipments. The resistor tube is indicated at *14* and the operating coil at *11*. When the operating coil *11* is energized, the armature *24* will close in against the coil and the contact tips *23* and *23* will

touch the contacts *8* and *8*. Current will then flow through the side heating units to raise the temperature of the molten metal in the crucible.

When the swinging lever or *C* contact touches the stationary or *B* contact in the thermostat, current passes through the resistor tube *14* into the operating coil *11*; from the coil *11* it travels through the relay contacts *8* and *23* and the shunt *26*, then out into the line wire.

The contact tips at *8* and *23* should be kept clean. Inspection at regular intervals is essential. On the alternating current relay see that the contacting surfaces of the poles *20* and *21* and the laminated field of the armature *24* are cleaned at regular weekly intervals.

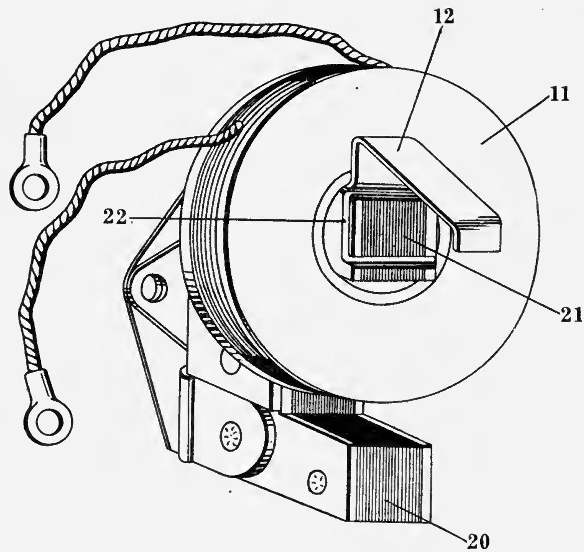


FIG. 92a.—Operating coil *11*, of the alternating current control, shows the laminated pole faces *20* and *21*. Around the upper pole face *21* is fastened a copper band. This is called a pole shader.

all connections are as they were before making the repairs, replace the rheostat in the control box in the same manner as when it was taken out.

Electrical Terms

It will be necessary to acquaint yourself with the following definitions of electrical terms used in this book. The average person has difficulty in understanding electrical terms because electricity is something that cannot be seen like water, or smelled like gas, escaping from a pipe. To understand electricity in the sense of appreciating how it is used on the Intertype, some theory will have to be used.

Series connection means that two or more heating units or elements are connected in line with each other. Current enters one terminal, passes

through the windings, out of the other terminal and directly into the next unit, through its windings, and out to the opposite side of the line.

Parallel or Multiple connection means that two or more units are wired in such a way that each makes a complete circuit. Current enters the unit, passes through its windings and directly back into the line. An electrical circuit carrying current may be simply explained by considering an iron pipe through which the water is flowing under pressure. The pipe represents the *circuit* and the water passing through it represents the *current.* The volume of water flowing represents the *amperes* and the pressure of the water represents the *volts.* A total break of the pipe allowing the water to escape would

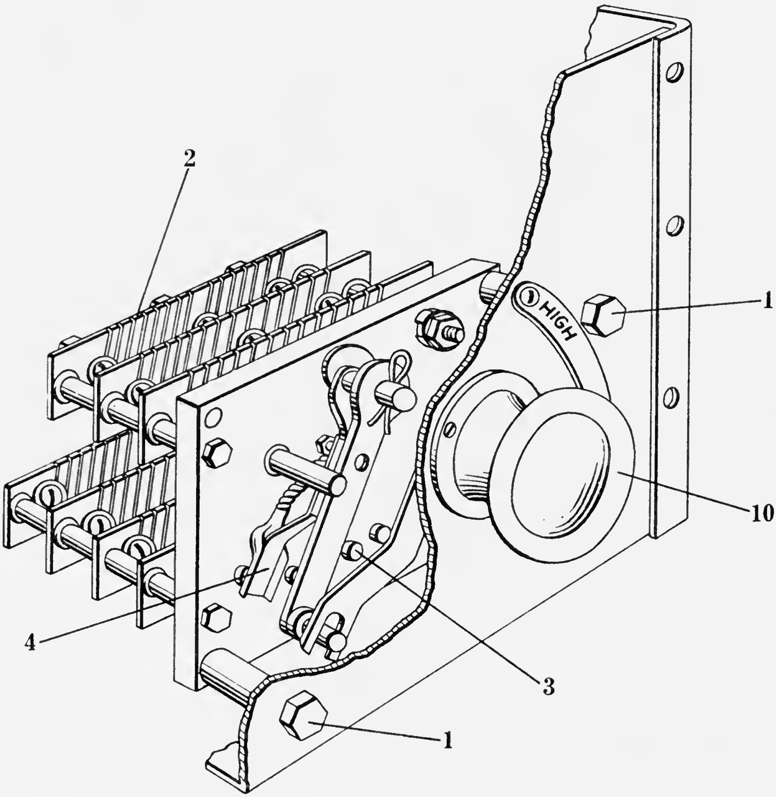


FIG. 93.—Electric Pot Throat Unit Rheostat. This rheostat is mounted inside the control box and the knob outside the box is adjustable to move the finger *4*, from one contact button to another. One of the buttons is indicated at *3*, so more or less current will flow through the crucible throat heating unit. The small resistor units (one of which is shown at *2*) are separately replaceable in case one of them should become "open."

represent a *short circuit,* and a valve in the pipe, partially closed, would represent *resistance.*

The **Circuit** is that part of the equipment which is intended to carry electric current, such as copper wires, resistance wires, switches, etc. They are all insulated from the frame of the pot.

The **Current** is the electricity passing through the equipment.

Amperes is the volume of current passing through.

Volts is the pressure forcing the current through the circuit.

A **Watt** is the product of the volts multiplied by the amperes.

A **Kilowatt** is 1000 watts.

A **Kilowatt Hour** is one Kilowatt used for one hour.

A **Partial Ground** is where the electric circuit accidentally touches the frame of the pot; for instance, where the insulation is torn or rubbed loose from a wire which causes contact with the metallic cable covering.

Short Circuit.—Since current always flows along the path of least resistance, wires, heating units and coils must be insulated with non-conducting material so there will be no leakage. If the insulation is removed or broken (permitting the wire to touch a metal part of the pot or panel box apparatus) the current will flow through the frame of the machine instead of the heating circuit. This condition produces a larger flow of current than desired and always blows a fuse.

An **Open** is an interruption in the electric circuit caused by a broken wire, so that current cannot flow through to complete the circuit.

Resistance is an obstruction in the electric circuit retarding the flow of current. There are two kinds of resistance—intentional and unintentional. Intentional resistance is used to control the flow of current to regulate the heating power of the throat heating unit more or less as needed. It is also used to cut down the amount of current that may flow through certain parts of any control apparatus. Unintentional resistance causes trouble and may be due to a loose terminal which is supposed to be fastened tight and through which current will be choked down because the terminal parts heat and oxidize. Link fuses used on the line wires to the control box may cause unintentional resistance. If the fuse caps are not screwed down tightly upon the seat in the fuse case, current will be imperfectly transmitted, and the link will heat and become shriveled or burned. This will have the effect of causing the metal in the pot to be cold.

Troubles—Testing

Few interruptions to continuous operation are likely to occur, but abnormal conditions that might develop will be described together with the easiest method of detection and relief.

Satisfactory operation of an electric type metal melting pot will depend largely on (1) good heat insulation, (2) correct voltage, and (3) proper action of the automatic temperature control equipment. The wattage or

power consumed by an electric heating device is actually the heat energy. Therefore, a definite amount of heat energy is required to melt the metal and bring it to a given temperature.

The main electrical troubles to be found are *open circuits, grounds* and *short circuits.*

Examining the Fuses

The fuses should be examined to see that they have not been blown, and the best way to examine them is to remove them from the panel and test them with a lamp. It should be noted that the fuses are in the circuit outside the snap switch, so that the fuses are alive regardless of whether the snap switch indicates *On* or *Off.*

In the case of fuses having removable links, see that the link is not shriveled, and tighten both fuse link caps. A shriveled fuse indicates poor contact of the caps with the link which has set up a resistance.

Before doing work of any nature on any part of the electrical equipment always turn the snap switch to the *Off* position.

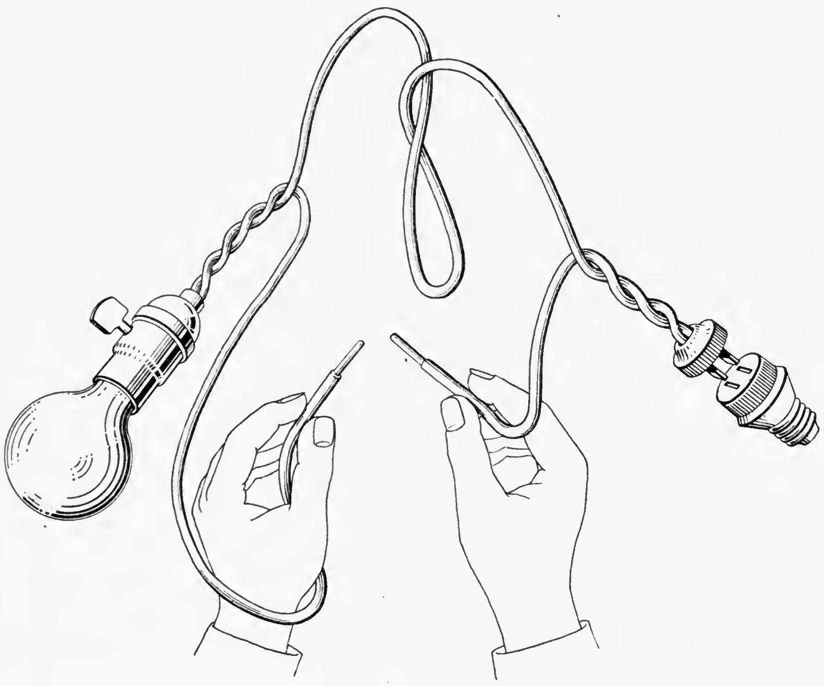


FIG. 94.—The Lamp in Series which is used for testing open circuits and short circuits.

When disconnecting wiring, always mark each wire and its corresponding terminal clearly so that it may be correctly replaced. Experienced electricians who are familiar with ordinary simple testing of this nature may devise their own means, but the inexperienced are strongly advised to closely follow these instructions.

The equipment necessary to make all electrical tests is inexpensive and ordinarily is at hand in an electrically lighted building.

The Magneto

The best method is to use a magneto when testing for grounds and a lamp in series when testing for open circuits and short circuits.

A hand-operated magneto may be borrowed from your local power house, when the size of the installation does not warrant the purchase of one.

Before testing with a magneto, the two bare tips of the lead wires should be held together while crank is briskly turned to see that bell rings distinctly.

In testing for grounds with a magneto, hold one bare tip of a lead wire on a clean part of the metallic surface of the pot or unit being tested and touch the other bare tip of the lead wire to an electrical connection of the part being tested; now turn the crank briskly and if the bell of the magneto rings, the part under test is grounded. If the bell does not ring, the circuit is not grounded.

Care should be taken that the tips of the leads are clean and that they touch a clean metallic surface. Dirt and corrosion are insulators.

The Lamp in Series

When testing for open circuits or short circuits, a lamp in series is the best equipment. It may readily be made from an incandescent lamp of your regular voltage, an ordinary lamp socket, a convenient length of lamp cord and an attachment plug.

Connect the lamp cord to the attachment plug and the socket in the ordinary way, then cut one of the two strands of the lamp cord a few inches from the lamp socket. Remove the insulation for one inch from the two ends of this strand of the lamp cord and twist the wires tightly.

Before making a test with this equipment, screw the lamp firmly into the socket, connect the attachment plug to a convenient outlet and touch the two bare tips of these wires together. The lamp should now light.

When testing for open circuits, connect the two bare lamp cord wire tips to two different electrical terminals of the units under test. If the lamp lights it indicates that the units are not open. When making the above test, all inter-connecting wires to the units being tested must be disconnected.

Grounding

It is important that the frame of every machine be thoroughly grounded. That is, there should be an actual connection made from the frame of every machine to a gas or water pipe.

The Pot Will Not Heat Up

See that the main switch is in the *on* position. Make sure that the fuses are intact. Test the line to make sure you have current up to the fuses in the control box. If the metal still fails to heat, it indicates an *open* in the connecting wires or in the crucible heating units. Turn the current off by turning main line switch to the *Off* position, and remove pot terminal cover.

If indications are that heat is coming from only one side of the pot, it is very probable that one unit is either *open circuited* or *grounded.*

Simple Test for Open Units

If one of the crucible units should burn out or become *open* and you cannot readily determine which one it is, turn the main line snap switch to the *Off* position, and remove the pot terminal box cover to expose the heating unit terminals. Disconnect terminal No. 1 (numbered 1 to 6 from left to right). Turn on the main line snap switch and make sure that the relay is closed. Then quickly tap the terminal with the disconnected wire. If there is a spark or arc when the wire touches the terminal, the side unit nearest the terminal is not *open.* Replace connection No. 1 and repeat the same operation with terminal No. 3 to determine whether the opposite side unit is all right. The same test on terminal No. 5 will show whether or not the throat unit is *open.*

Be sure that the main line switch indicates *Off* before removing or replacing any terminal connection and that each connection is replaced before testing the next unit.

An *open* heating unit is useless and must be discarded.

Test for Grounds

If the units pass the above tests, they might be grounded. Remove the units from the metal pot and lay them on a board. They should be tested for grounds by placing one wire of the test lamp on the outside sheath of the unit and the other wire on one of the terminals. If the lamp lights the unit is grounded. If the lamp does not light the unit is all right. Note that in the test for *open circuits* the lamp *should* light on a good unit, and in the test for *grounds* the lamp *should not* light on a good unit.

A possible cause of grounding may be that the mica washers at the terminals of the first style heating unit have become broken or punctured by mechanical injury. The terminals should be carefully examined for this or any other defects.

Do not test units for grounds while the units are in the pot.

The Pot Heats Slowly.—If the pot heats slowly it is probable that one of the crucible heaters may be *open* and the other is in good condition.

Slow heating may be caused by improper adjustment of the thermostat, so that the heating units are disconnected from the line before the metal has

reached the maximum temperature. If the pot heats slowly, adjust the thermostat.

Abnormally low voltage may cause the pot to heat slowly, but this is very seldom the case. If the voltage of the line is 15 per cent less than the voltage of the pot, it will require 20 per cent longer to bring the metal up to operating temperature.

Maximum and Minimum Temperatures.—To test the operation of the thermostat, place a thermometer in the metal, which should register between 535 and 550 degrees. Observe when the thermostat throws the relay to open or closed position and read the temperature on the thermometer at successive operations. The difference between on and off temperature should not exceed 25 degrees Fahrenheit.

The Fuses Blow

If the fuses keep blowing, it indicates that some part of the equipment's electric circuit is *grounded* or *short circuited* and it will be necessary to locate and rectify this condition before normal operation can be resumed. This sometimes can be found within the cables.

Fluctuating Voltage

It is of the utmost importance that the voltage be of the same rating as the heating unit equipment. If line voltage be habitually low the metal cannot be heated to high enough temperature. If too high, fuses may blow.

Fluttering Switch.—A switch in the electric pot control box is said to flutter (open and close) with metal pot motions as the machine is being operated. This can be caused by a faulty mechanical condition of the metal pot adjustments, a dirty plunger or a weak thermostat lever spring that is not strong enough to hold the lever in a constant position against the motions of the metal pot as it rocks back and forth.

Operation and Maintenance

If properly installed, there is no reason why any attention should be required. It must be expected, however, that occasionally a unit may burn out, but in order to assist in the proper maintenance of the equipments the following suggestions are offered:

If the throat unit is burned out, it will be impossible to force metal through the mouthpiece. Generally, this will be sufficient indication that a unit is defective. If either pot side heater burns out, the metal on one side of the pot will remain frozen long after it has melted on the other side.

The pot will operate satisfactorily on 110 volt circuits, with one unit for a short period, but it is recommended that defective units be replaced as soon as convenient. On 220 volt circuits, however, a burned-out unit will have to be replaced as soon as detected.

Replacement of Heating Units.—Attention is called to the fact that these heating units can be installed or replaced with a minimum of trouble, as they fit in pockets on the crucible and are very accessible.

To Replace the Throat Unit.—To replace the throat unit, simply take the cover off the terminal box and the clamp holding the unit terminals to the box terminal frame. Remove the asbestos immediately under the mouthpiece, when the unit can readily be removed with a pair of pliers and a new one put in place. The opening under the mouthpiece should then be filled with wet asbestos. Care should be taken when applying a new throat unit to see that it is held up close to the crucible and mouthpiece by the steel plate. On the latest machines, a clamping screw holds the unit tightly against the throat of the crucible and this must first be loosened before removing the unit.

To Remove the Side Units.—To remove the side units, it is first necessary to remove the pot cover, when the units will be exposed and readily accessible. The cover can be removed when the metal is molten, but if the metal is *frozen* the cover is held solidly to the pot by the stem of the thermostat, which projects into the solidified metal. In this case, remove the four screws passing through the corners of the thermostat base, also the two screws which hold the body to the base-plate, which will permit the body of the thermostat to be removed from the base-plate. There are two flat-head screws which hold the base-plate to the thermostat stem which, if removed, will allow the pot cover to be raised, the thermostat stem still being fixed in the frozen metal. The units may now be inspected, or replaced, after which the cover and thermostat parts may be put back in reverse order. It is thus apparent that repairs may be made when the pot is either hot or cold.

Packing Pot and Crucible

In the electric pot it is absolutely imperative that the space between crucible and jacket be solidly packed with heat insulating material to prevent the escape of heat, because the efficiency of the pot is very seriously impaired by voids in the packing.

Ordinary asbestos pipe covering material in the loose form may be used for this packing, and should always be used dry. The best way to pack a pot is to remove the cover and turn the pot upside down on the floor, although it is possible to pack a pot without removing from the machine. Before commencing to fill in the spaces to be packed with asbestos, stop the crucible well with a wadded cloth. Fill and tightly pack the insulation on the sides, back and throat of the crucible, fill in space at the bottom and replace the bottom cover, then turn the pot right side up and fill any spaces that remain. Wet packing should be used to fill the cover and the openings around the mouthpiece.

It is very important that pots be carefully packed, otherwise the following may occur:

(1) Low efficiency and high operating cost due to the escape of heat through walls.

(2) Slow heating up, and cold metal while running, especially when casting rapidly.

(3) Frosty type in slugs due to voids in packing under throat.

Unless there is something radically wrong with packing or line voltage, the metal should be ready to cast in about one hour after turning on the current.

To Remove Electric Pot

If it becomes necessary to remove the metal pot from the machine for repacking or crucible replacements, proceed as follows:

Run the machine ahead until the first elevator rests on the vise cap, shut off the controlling lever before the mold disk advances, shut off the motor, pull plunger pin and take out plunger, dip as much metal as possible from the crucible, lower the vise to second position, remove the pot lever, disconnect and remove the mold slide, take off the pot leg caps from underneath the shaft, loosen the front pot leg adjusting screws (do not disturb the top or back leg adjusting screws), replace the pot lever shaft and tighten the set screw, pass a piece of flat belting between the pot lever shaft and pot jacket to serve as a handle, remove the pump stop bracket, remove the mold disk shield (flat plate above mold disk fastened by three screws to face-plate), shut off the power to the pot line by turning the main line snap switch, disconnect and remove thermostat, remove terminal box cover from side of pot and disconnect the three terminals to which the three wires from the control box are attached, unscrew cable nut and drop the cable. Have someone lift the pot legs from the bushings while another person supports the back of the pot by means of the belting strap inserted through the opening and around the pot lever shaft. Lower the back end of the pot and with a rocking motion of the pot legs, lift the pot out and over the lowered vise. To reassemble, reverse the above procedure.

To take a red lead or Prussian blue impression of the mouthpiece see that section on page 160.

Cost of Operation

Exact figures on the cost of operation of the Intertype electric heating equipment depend on the number of hours of operation per day, the amount of metal melted, and on the power rate. The following data is the result of tests which were made under what might be called average working conditions:

It requires from 50 to 55 minutes for heating up the metal (from cold to 550 degrees F.). The current consumed in heating up is from 1.5 to 1.65 kilowatts. The power required to maintain the temperature at 550 degrees without casting slugs is from .5 to .55 k. w. per hour. When casting, the current consumed is from .1 to .3 k. w. per hour additional.

The daily power consumption per 8-hour day of continuous operation is—

	Minimum	Maximum
Initial Heating	1.5 k.w.h.	1.65 k.w.h.
Maintaining temperature and casting slugs at .6 to .85 k.w. per hour....	4.8 k.w.h.	6.8 k.w.h.
Total consumption per day of 8 hours continuous operation.............	6.3 k.w.h.	8.45 k.w.h.
Cost per day at—	Minimum	Maximum
1 cent per k.w.h..................	6.3 cents	8.45 cents
2 cents per k.w.h..................	12.6 cents	17.9 cents
3 cents per k.w.h..................	18.9 cents	25.35 cents
4 cents per k.w.h..................	25.2 cents	33.80 cents
5 cents per k.w.h..................	31.5 cents	42.25 cents

NOTE.—In the above table the maximum figures are for a large output, especially of the larger sizes of slugs; the minimum figures are for a moderate output, especially of the smaller sizes of slugs.

Chapter XVII

THE GASOLINE BURNER

It is generally assumed that a gasoline burner will require more attention and care than a gas burner. There is no reason why anyone who will handle it intelligently should not obtain results. It is advisable that the person in charge of the machine make a careful study of the burner and its operation, and that these suggestions be followed closely.

Every burner is carefully tested before it leaves the factory. The test consists of an inspection of the various pipes and valves, to see that they are free from particles of dirt or oil, followed by application of the burner to a machine, and adjustment until it produces a perfect flame under pot and mouthpiece.

Attaching Gravity Feed Burner

Place the mouthpiece burner in position under the mouthpiece (see Figs. 95 and 96), fastening it by means of the screw W-836.

Now place the main burner (U-508) in position under the metal pot (see Fig. 99), fitting the mouthpiece burner needle valve U-455 (Fig. 96) under the supporting hook which projects from the air mixer U-503 of the mouthpiece burner. Support the burner by pushing the rod U-140 through the pot jacket and through the holes in the small brackets U-454 which are attached to the bottom of the main burner plate. Be sure the burner is perfectly level, and see that the mouthpiece burner needle valve U-455 points directly toward the center of the opening to the mouthpiece burner air mixer U-503.

Connect the coil pipe U-385 with the main feed pipe. The latter should be a ¼″ pipe and should lead to a tank not less than six feet above the level of the burner and at least ten feet away from it (see Fig. 97). There should be a shut-off valve between the tank and the burner, in a convenient position near the latter.

Gravity Feed Burner Hints

If the burner is removed from the machine for inspection, note the following before replacing it: Be sure that all the parts are clean. This is important, because even very small particles of foreign matter are liable to work their way into the valves and choke off the supply of gasoline. Inspect the two needle valves, the one which controls the flow of gasoline to the main burner *2*, Fig. 99, and the one which controls the flow to the mouthpiece burner *3*, Fig. 99. Take them out and make sure that the points are straight and sharp. Unless these points are in perfect condition, it will be impossible to secure satisfactory results. See that the small opening in the mouthpiece burner valve is not entirely closed, and on the other hand, that it is not too

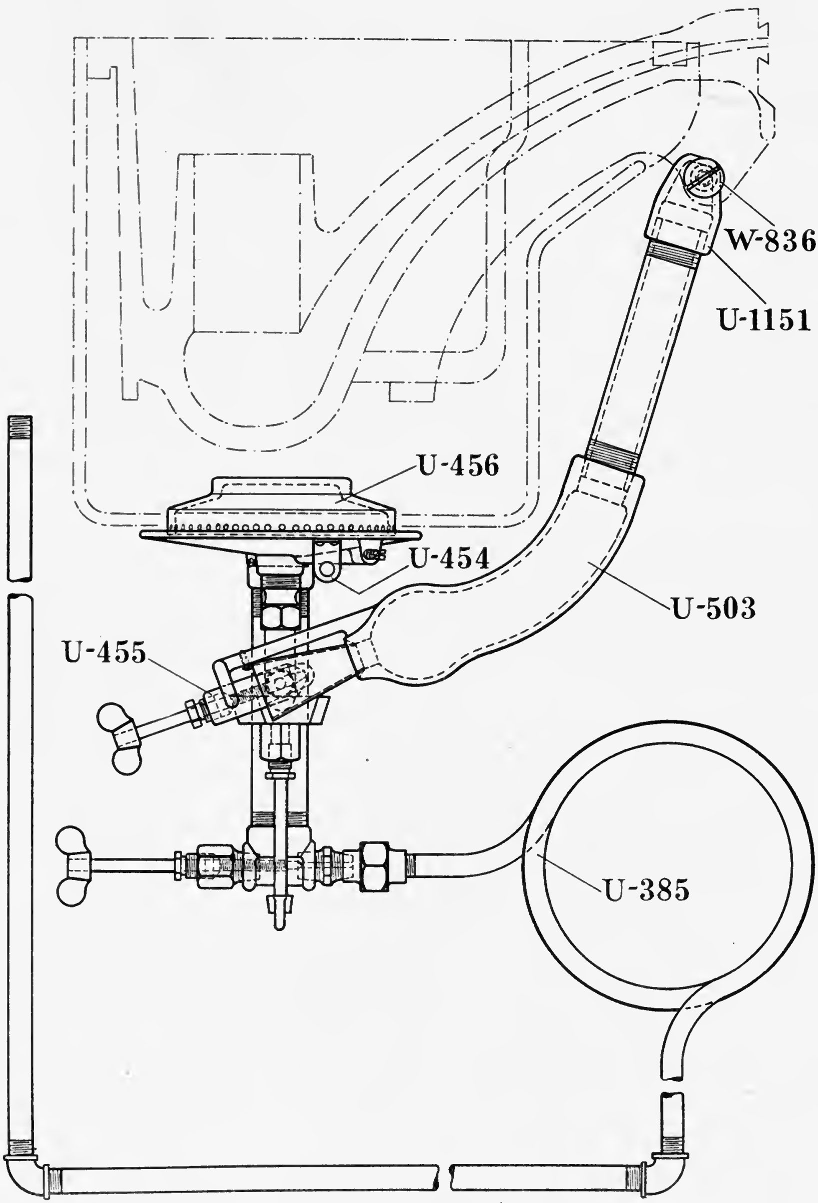


FIG. 95.—The Intertype Gravity Feed Gasoline Burner (side view) in position under the metal pot crucible, which is represented by the dot-and-dash lines. The application and operation of the burner are explained in the text-matter.

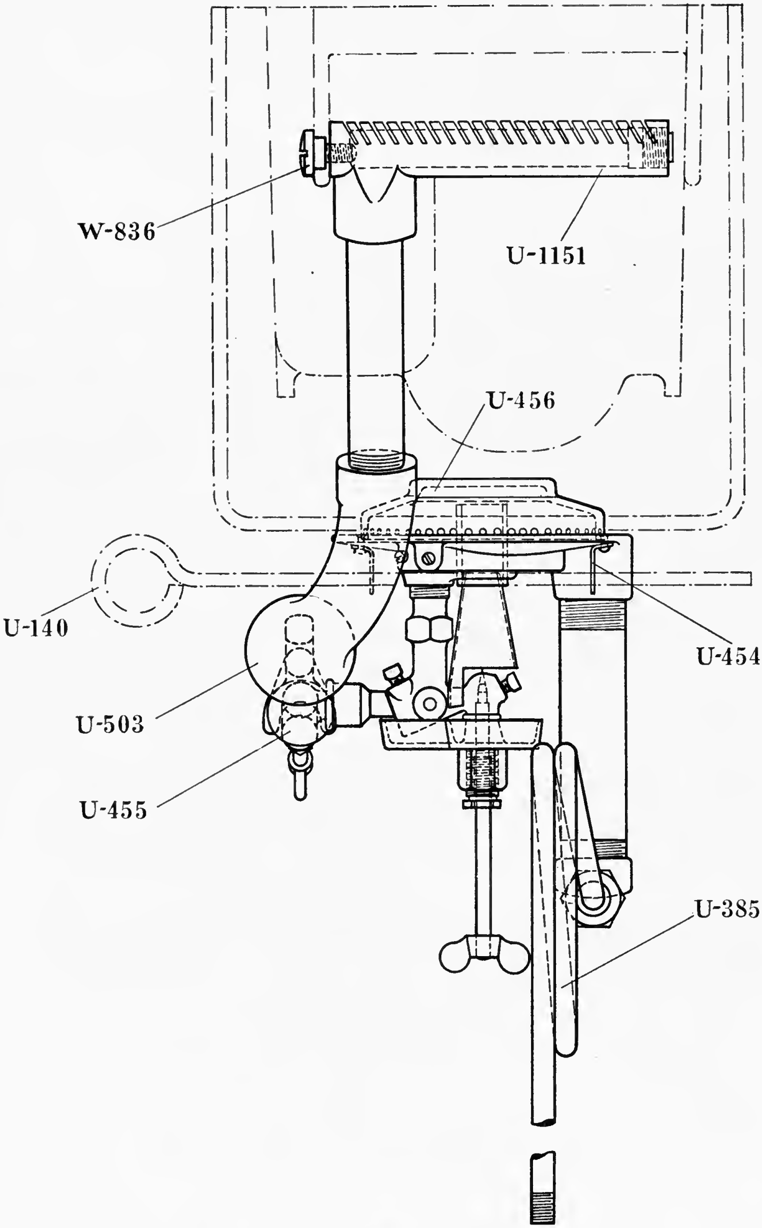


FIG. 96.—Intertype Gravity Feed Gasoline Burner (front view). The main burner is supported by the rod U-140, and the mouthpiece burner is supported by the screw W-836.

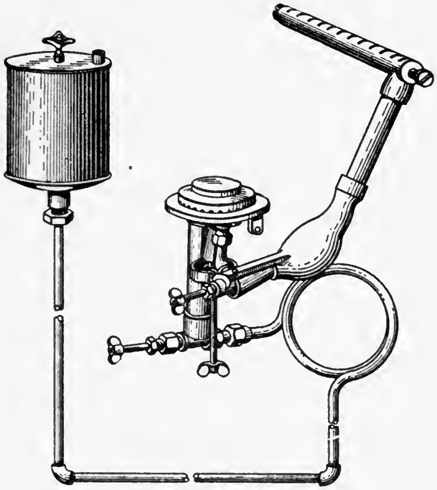


FIG. 97.—Gravity Feed Gasoline Burner equipment showing storage tank and main feed pipe connection to burner. The tank should be placed at least ten feet away from the burner and not less than six feet above it.

FIG. 98.—Gravity Feed Gasoline Mouthpiece Burner and Mixing Chamber Bulb. The screw W-836 (Fig. 96) holds the burner tube in position under the crucible mouthpiece.

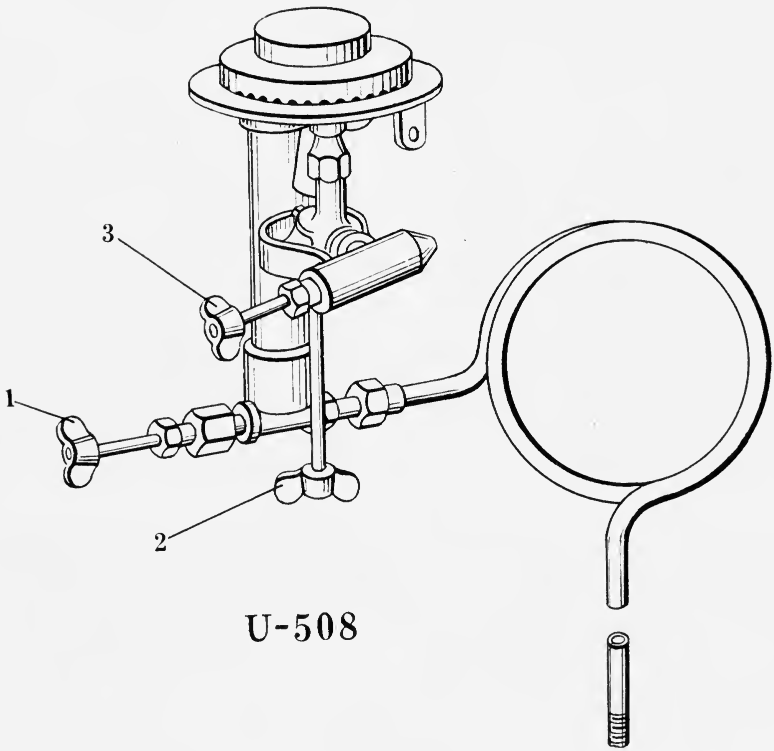


FIG. 99.—Main Burner of the Gravity Feed Gasoline Burner. The feed valve is indicated at *1*; this valve when opened permits gasoline to flow from the feed pipe into the filter tube and from there to the main burner valve *2* and the mouthpiece burner valve *3*. When the valves *2* and *3* have been turned to properly regulate the main burner and mouthpiece flames, the feed valve *1* is used as a pressure valve to regulate the amount of gasoline flowing to the burners. After the burner has been generated with alcohol before starting to heat the metal in the pot, it is only necessary to open the shutoff valve in the pipe line and ignite the main and mouthpiece burners.

large. This can be tested by blowing through it. The opening should be so small that it is barely possible to detect it. Also see that the opening in the pot burner valve is free from dirt and that the needle valve fits into it properly. This opening should be somewhat larger than the opening in the mouthpiece burner valve.

The burner must always be generated before it is started. Fill the priming cup below the main burner valve with alcohol and light it, first being sure that the gasoline is shut off. When the alcohol has all burned out, turn on the gasoline and light the main burner; then light the mouthpiece burner.

Do not generate the burner with gasoline. Use alcohol. If gasoline is used it will cause soot to accumulate and this will work into the valves and cause trouble. If the flame is yellow when the gasoline is first turned on, the burner has not been sufficiently generated; that is, the burner is not hot enough to vaporize the gasoline properly. Shut off the gasoline and burn more alcohol

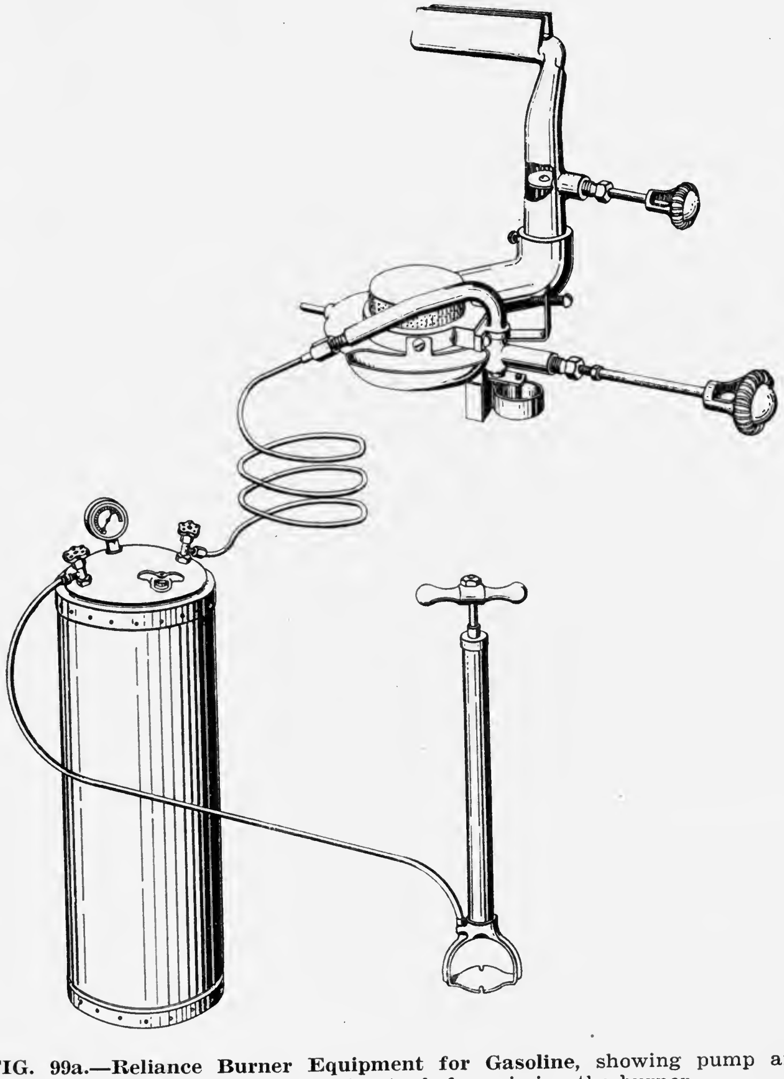


FIG. 99a.—Reliance Burner Equipment for Gasoline, showing pump and pressure tank and auxiliary gasoline tank for priming the burner.

in the priming cup. If the yellow flame is allowed to continue even for a short time it will cause a sooty deposit which will eventually clog the valves.

Use the best gasoline obtainable. Gasoline containing oil, water or dirt, even in small quantities, may be expected to cause trouble. If there is any doubt as to the purity of the gasoline, it should be strained through a chamois skin as the tank is filled.

When closing the valves, be careful not to use too much force. Screwing them in too tightly will force open the feed holes and damage the needle points.

To shut off the burner, use the valve on the main feed pipe, not the needle valves, nor the pressure valve at the bottom of the burner.

If the metal in the pot is too hot or too cold, adjust the main burner valve *2*, Fig. 99. If in doubt as to whether the metal temperature is correct, use a thermometer. The proper temperature is 550 degrees. Variation of 25 degrees from this point should not cause imperfect slugs.

If the main burner flame sputters, it may be necessary to adjust the air mixer. This is the short tube directly above the main burner needle valve. Lowering the tube will reduce the amount of air in the mixer.

The Reliance Gasoline Burner

The Reliance Gasoline Burner equipment, Fig. 99a, is now furnished instead of the first style gravity feed type burner. This burner has proved to be the most satisfactory design obtainable and is thoroughly recommended wherever gas or electricity is not available. Complete instructions for installing and operating the Reliance burner equipment are furnished with orders.

Chapter XVIII

METAL

It is not our intention to enter into any lengthy discourse upon the metal question, only insofar as we are interested in the customer purchasing his metal from a reliable manufacturer who will furnish the best grade of metal free from impurities, and further, we are interested in the customer maintaining his metal supply in a properly balanced condition through proper remelting methods, so that good type may be produced from the machine. It is stated at the outset that the condition of the metal has everything to do with the output of the machine. The mechanical condition of a machine may be perfect, but if dirty, contaminated metal is used in that machine there will be disastrous results in the way of back squirts, clogged crucible throat, bleeding feet on slugs and apparently uncontrollable temperature regulation. No amount of mechanical adjustments can overcome the troubles incident to the use of a poorly conditioned metal stock.

Careful Remelting Necessary.—The customer having purchased a quantity of metal from his supply house, should see that the remelting is performed in a conscientious and trustworthy manner. It is so easy to rob the metal of its richest ingredients through slovenly skimming, and it can become contaminated through carelessness in permitting brass, zinc or other foreign metals to be absorbed.

Oxidation.—At each remelting, a certain percentage of the ingredients oxidize. At the same time, one or more of the elements rise to the surface and may be lifted out with the dross. It is the duty of the one engaged in pigging the metal to do his work as quickly as possible. The longer a pot of molten metal is exposed to the air, the more oxidation takes place from exposure to the air, and as the metal is skimmed, care should be exercised to see that no free metal is emptied directly into the dross drum. Dross should always be reduced to a fine gray powder without any free metal in the content, before returning to the metal company for credit.

Formula.—Intertype metal is composed of three elements—lead, antimony and tin, approximately in the proportion of 85 per cent lead, 11 per cent antimony and 4 per cent tin. Lead is present in the largest amount but is too soft and does not have all the properties necessary to be used alone for type metal. To supply these deficiencies antimony and tin are added.

Antimony gives hardness to the metal. It also has the power to fill out the mold cell and expands just as solidification occurs. After solidifying, the metal contracts the same as any other metal, but in the case of a slug, at the instant of passing from the liquid to the solid, it fills out all the details in the mold, and after solidifying, draws away, giving a perfect reproduction.

That is, good metal will do this if the supply has not been "starved" by careless remelting.

Tin adds strength and fluidity to metal, but does not reduce the melting point of the alloy, since all metals freeze at about 475 degrees F., even if tin is not present. Since tin does add to the fluidity of the alloy, it permits casts to be made at much lower temperatures with more nearly perfect results. Tin also gives body to the metal and adds to its toughness, and has the effect of giving smooth, perfect faces to the letter characters.

Metal Melting Equipment.—The necessary equipment required to repig the metal consists principally of the furnace, shovel, ladle, skimmer, flux tube and the mold into which to pour the metal to form pigs.

In purchasing a furnace the customer should select one containing as large a pot as possible. By this we mean a pot that will hold as much of his regular remelt as can be melted down at one time, rather than refilling a small pot several times in order to pig the same quantity of metal. It is much better and more economical to have a remelting furnace a little larger than present needs might require. Metal will be kept in a better balanced state when the remelting is done in a large quantity with one firing.

The Flux Tube consists of an iron rod at the lower end of which is a short open-end length of pipe. A small quantity of flux powder, wrapped in a piece of newspaper, can be put in the open end of the pipe which is then submerged in the metal. In other words, the flux tube is merely a means of holding the flux at the bottom of the pot while it slowly passes out of the paper and upwards through the metal, in order to remove any impurities which are released from suspension in the mass. These impurities rise to the surface, due to chemical and mechanical action of the flux.

Melting the Metal.—After the furnace has been charged, the burners should be turned to give just enough heat to melt the metal slowly. As the contents melt, fresh slugs can be added until the pot will be as full as possible before skimming.

The metal should not be heated much above 600 degrees F. Plunging a strip of folded newspaper into the metal will roughly approximate its temperature. Submerge the end of the newspaper wand and hold it down about five seconds. Upon withdrawal it should be a light brown color. This test is suitable for remelting temperature determination, but a thermometer should be used to read the temperature of the metal in the machine pot.

The substance on the surface contains both dross and free metal and the metal can be released by the use of Fluxor, obtainable from this company. Its proper use will liberate the free metal elements from the dross. Slowly stir the metal with a ladle until the dross has been reduced as much as possible to a gray powder, which can then be skimmed off.

If Fluxor is not used at each remelting, the metal skimmings should not be deposited in a drum or other container used to ship it to the metal supply

house, but rather into a flat pan so that free metal which comes away in the ladle can run out of the dross and be returned to the pot.

It is always a good plan to remelt the skimmings from the furnace pot. Never put dross in shipping containers until it has been reduced to powdered form.

Skim the surface of the metal clean and pour into pigs as rapidly as possible.

Metal Analysis.—At regular intervals a metal sample should be sent the metal manufacturers for analysis. This analysis will show exactly the condition of the metal in use, provided the sample has been properly prepared so that it is representative of the stock in the plant. To secure a representative sample, gather a small quantity of machine trimmings (jet projections and vent sprues trimmed by the back knife and the rib trimmings from the side knife which fall to the floor) every day for a week, and melt together into a small pig, which can be sent to the metal manufacturer. It is never proper to gather several slugs at one time and expect an average representative sample of the entire stock in use. Remember, the metal dealer's chemist can only analyze the sample with which you supply him and if this analysis is to show the condition of all the metal in your plant it must be made up from small quantities gathered over a period of several days. Provided the remelting duty is conscientiously performed and no foreign material contaminates the metal, once in three months should be frequent enough to have an analysis made. A report will be submitted as to the condition of the metal stock and your metal manufacturer will be only too glad to co-operate in securing the best results—that is his business.

Toning Metal.—Never attempt the mixing of a toning metal into the stock until after an analysis has been made, and then only upon the advice of the supply house. Reputable concerns make up toning metal according to the evidence produced through analysis. It is made up according to the analysis for the particular occasion and an entirely different toner might be needed the next time.

We repeat here that the skimmings from the metal pot should be remelted after having been taken from the furnace, so as to refine as much metal as possible from the dross, which can be returned to the stock and the gray powder put in the dross drum for shipment to the manufacturer in exchange for new metal rich in tin and antimony. This metal when added regularly will maintain the metal stock in proper balance as it supplies the natural loss due to frequent remeltings.

Contaminating Agents.—Sweepings from the floor, the sawdust gathered from the waste receptacles and trucks or boxes containing slugs from forms should be inspected before dumping into the furnace. It is easy enough to contaminate the metal supply with foreign materials, but it is another matter to eradicate troubles due to bad metal and bring its condition back to a pure state by the elimination of the foreign materials.

Metal kept in proper balance, free from impurities, will minimize machine stoppages due to casting troubles. If unbalanced metal containing impurities is used, no amount of work expended to make the casting apparatus function properly will be of any use. The machine is designed to work in conjunction with metal of the proper content.

Foundry type, zinc etchings, brass rule, matrices, service plates, stereotype casts, and electrotypes all come under the head of contaminating agents and simply will not do the metal used in Intertype machines any good.

Electrotype plates have a backing composed principally of lead and a very small percentage of tin and antimony. Adding these plates to the metal stock will certainly reduce the tin and antimony proportion of the entire stock to a serious degree, and if very much is added the metal will be useless.

The copper shells remaining after the backing metal has melted from electrotypes will contaminate metal to such an extent that, while apparently none of the copper has become mixed with the metal, small amounts do separate from the original plates and will cause trouble by clogging the mouthpiece jets.

If enough electrotype metal is introduced, it will have the same effect as foundry type.

Foundry type is much harder in body than line-casting machine metal. Adding it to the metal stock will cause clogged mouthpiece jets and slugs will be cast that have imperfect faces.

In some plants stereotype solid and shell casts are trimmed in the composing room on the same saws which are used for trimming slugs. Naturally, the sawdust and small cuttings are deposited in the same receptacle. In time the line-casting metal will become affected. A great many stereotype rooms make all flat or shell casts from metal used in the composing room. This plan costs no more to operate than where two separate metals are used, and stereotype casts made from it are equally as good.

Zinc, of which there is always more or less in the average composing room in the way of advertising cuts and half-tones, is one of the most common sources of trouble in metal contamination, and its possibility of becoming mixed with the line-casting supply requires constant watchfulness on the part of every person concerned to see that all zinc etchings are isolated in a separate container. Brass rules and matrices can be the means of introducing zinc and copper when Intertype metal is in a molten state, which readily absorbs either one of them, even at a temperature below the melting point of zinc.

Proper Metal Temperature.—The metal used in Intertypes is operated at a normal casting temperature of 525 degrees to 550 degrees F., requiring a lower degree of heat than metals used for other printing purposes. The temperature of the metal in the pot will have to be raised considerably above normal if there is much loss of tin because the metal will be brittle and light slugs with poor faces will be cast. The loss of antimony in undue quantity

causes the metal to become too soft so that long press runs will flatten the type faces, and if the antimony content is too high the mouthpiece jets and the crucible throat may become clogged.

It is therefore important that the service the metal house has to offer be used to the fullest extent in the way of regular analysis. When the reports upon the condition of your metal are received, faithfully follow the advice tendered, and remember that the metal supply house is always anxious and willing to assist you in keeping your metal up to standard.

Chapter XIX

THE PUMP STOP

The pump stop, as its name implies, is a safety contrivance to prevent the pot pump plunger making a casting stroke when the machine is running idle, that is, when there are no matrices or spacebands in front of the mold. It also functions to prevent the pot pump lever operating when the matrix line is insufficiently spaced out. If the pot pump lever should be operated under either of these conditions, the result is obvious.

The pump stop consists principally of a small stop lever mounted on a bracket at the side of the machine column in such a manner that when actuated by the justification lever, through the action of an operating rod it will swing around and under a block fastened to the side of the pot pump lever. If, however, the matrix line is tightly justified by the spacebands, through the action of the justification levers, the stop lever will be inoperative and the plunger will cast a slug.

In Fig. 100, the perspective view shows the pump stop device. As will be seen, the height to which the justification lever *13* rises against the adjusting nuts *10* on the operating rod *1* determines whether the lever *3*, pivoted at screw *4*, shall be moved under the stop block *5* on the pot pump lever *6*, by the upward thrust of cone *2*. The justification lever *13* does not operate the stop lever *3* until it has risen within the last 3/16″ of its full stroke, and as long as a matrix line is tightly justified the spacebands will prevent the justification lever *13* making a full upstroke so that it cannot operate the pump stop lever *3*.

When the machine is running idle, the justification lever *13*, pivoted on the shaft *14*, through its contact with the justification cam by the cam roller *15*, rises high enough against the nuts *10* to force the cone *2* upward, throwing the pump stop lever *3*, pivoted at *4* under the stop block *5*, holding the pot pump lever up while the dip in the pot pump cam is passing the cam roller mounted in the pot pump lever *6*.

It will be seen that the pump stop is a safety device and is operated when the machine is running idle, when a matrix line is sent through without spacebands, or when a line is sent over with both matrices and spacebands but does not contain enough matrices so that the spacebands can justify it tightly between the vise jaws. Repeated casts from loosely-spaced lines would in time ruin a matrix set and the adjustment must be watched so that the pump stop will function correctly.

The pump stop bell hammer *8* strikes the bell in case the pump lever *6* does not descend to make a cast through action of the pump stop lever *3*. The spring *9* has two functions—it returns the bell hammer *8* and the stop

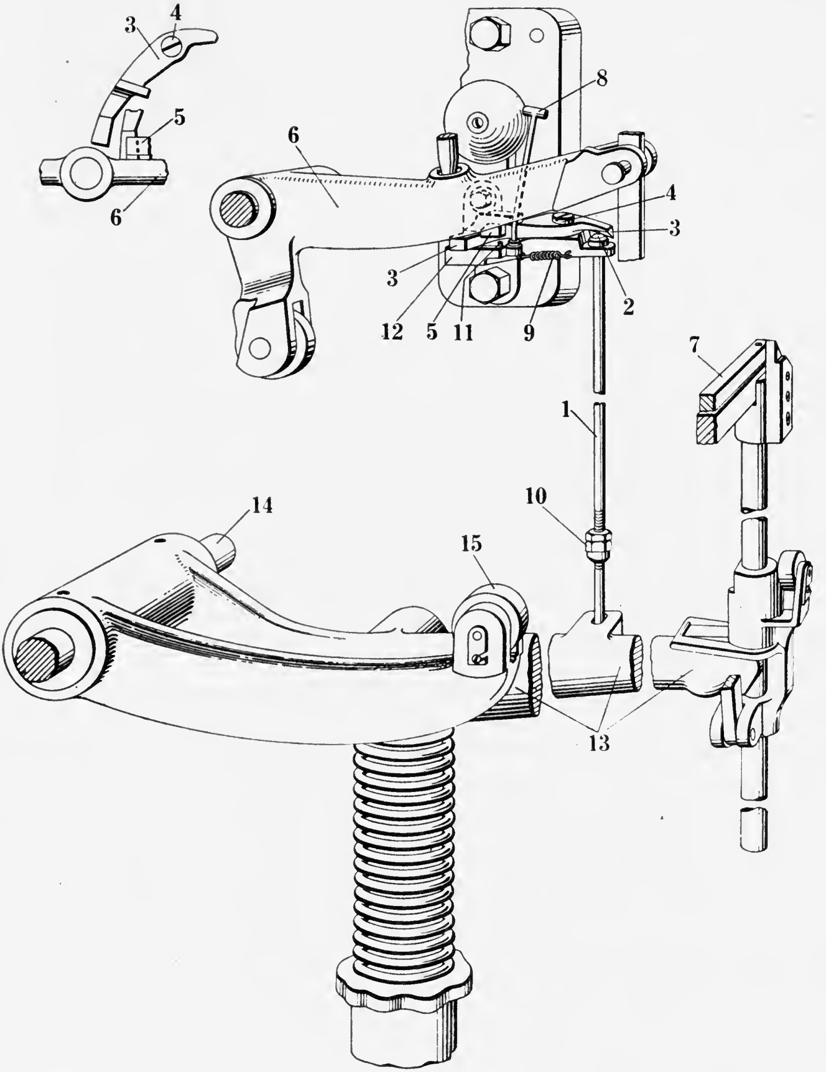


FIG. 100.—The Intertype Pump Stop. This device automatically holds up the pot pump lever *6* to prevent a downstroke of the plunger when the machine is making an idle revolution, or when a matrix line is not spaced out sufficiently so that the spacebands can justify the line. The pump stop lever *3* will be caused to move under the block *5* on the pot pump lever *6*, blocking the downstroke of the lever.

If the matrix line is properly spaced out, the justification bar *7* will strike the spacebands, which obstructs the full upstroke of the justification lever *13*, and the pump stop lever *3* will be inoperative.

A top view of the pump stop lever *3* pivoted on the screw *4* is shown in the detail drawing. When actuated by the cone *2* at the upper end of the operating rod *1*, the lever will swing around under the block *5* which is mounted upon the pot pump lever *6*.

lever *3* to normal position after cone *2* has retreated when both have been actuated by the operating rod *1*.

Adjustment of the pump stop is made as follows: Pull out the plunger rod pin in the pump lever, run the machine ahead without a matrix line until the justification lever *13* has made the highest stroke permitted by the inverted dip in the justification cam. The pot pump lever block *5* on the pot pump lever *6* will then be resting upon the stop lever *3*. The nuts *10* should be adjusted so that when the justification lever is at its highest stroke against the nuts *10* the stop lever *3* will come within 1/32″ of the stop pin *11* in the pump stop bracket *12*. The lever *3* should not touch the pin *11*. The adjustment made in this manner will insure proper operation of the stop lever during the last 3/16″ of the stroke of the justification lever and just before the pot pump lever has started to descend to make its casting stroke.

An abnormal condition may arise whereby the pump lever cam roller will have become worn flat through lack of proper lubrication, which will not hold the block on the lever high enough to permit the stop lever passing underneath. The only remedy is to replace the roller.

Pump Stop for Model X

The X machines are equipped with pump stops which operate from the right-hand vise jaw. The vise jaw is movable slightly as in other machines and when the spacebands are justifying the matrix line, the jaw is moved against a banking screw. If the line justifies tightly, the jaw will operate a lever mounted on the machine column and running back to a bracket above the metal pot. The bracket supports a smaller lever which is operated as the vise jaw moves the operating lever. A crooked wire spring returns the small pump stop lever to normal position after pressure from the vise jaw has been released. The vise jaw moves the pump stop to clear the pump lever according to the adjustment of a screw against which it bears. This screw is held by a nut which should be set so that when the line is justified, the pump stop lever will clear the block on the pump lever about 1/32″. Unlike the pump stop device used on standardized machines, the pump stop lever on X machines is always in position under the pump lever block unless moved out of the way by a justified matrix line before the cast takes place.

Chapter XX

THE EJECTOR

After a slug has been cast and the mold retreats from the matrix line, the mold disk makes a three-quarter revolution counterclockwise. During the passage of the mold in front of the back trimming knife, the mouthpiece jet and sprue projections are shaved from the bottom of the slug. The disk then stops with the mold containing the slug at a vertical position in front of the side trimming knives. The mold slide and disk are caused to make another forward stroke, and this is called the ejecting thrust. The mold face when in this position is against the three banking blocks described previously, which support the mold body, cap and liners from the strain of the breakaway of the slug when the ejector blade first strikes the slug during ejection. The ejector which pushes the slug from the mold is a thin steel blade conforming to the length of the slug which it ejects.

As soon as the mold has assumed a vertical position in front of the knives, the ejector is caused to advance, pushing the slug from the mold, between the knives, and from there, all in one continuous movement, to the slug chute, where the slug falls or slides upon a raceway or chute into the galley, ready for use.

Operation of Universal Ejector.—The ejector consists of a slide within a slide and works in the mold slide casting. The blade *1*, Fig. 101, is fastened to a holder or master blade *11* by means of a T-slot. The holder *11* is fastened with screws to the slide *29*. The slide *29* is caused to move forward and back again by the ejector lever *32* through the link *31*. The forward stroke of the ejector is caused by a small cam *34* on the side of the mold cam and driving gear *30*, by engaging the lever pawl *33*. After having made its extreme forward stroke, the cam *34* passes out of engagement with pawl *33* on the ejector lever *32*, and a lug on the transfer cam (cam No. 10) engages the projection *36* on the ejector lever *32*, which returns the ejector blade *1* to normal position.

The Intertype universal ejector used on 30-em machines has a magazine or box *15* containing ten solid blades of assorted sizes. The 42-em machine is equipped with an ejector magazine containing twelve blades, and on both 30 and 42-em machines the blades are used to eject any thickness of slug from 5-point body up to the largest sizes.

Forward Stroke Adjustment.—The forward or ejecting stroke of the ejector blade is regulated by a screw in pawl *33*. Raising the pawl will shorten the stroke of the lever *32* and lowering the pawl will lengthen its stroke. Set the pawl by means of the adjusting screw until the ejector blade clears the first style galley 1/32″. In the case of the new style galley, the front edge of

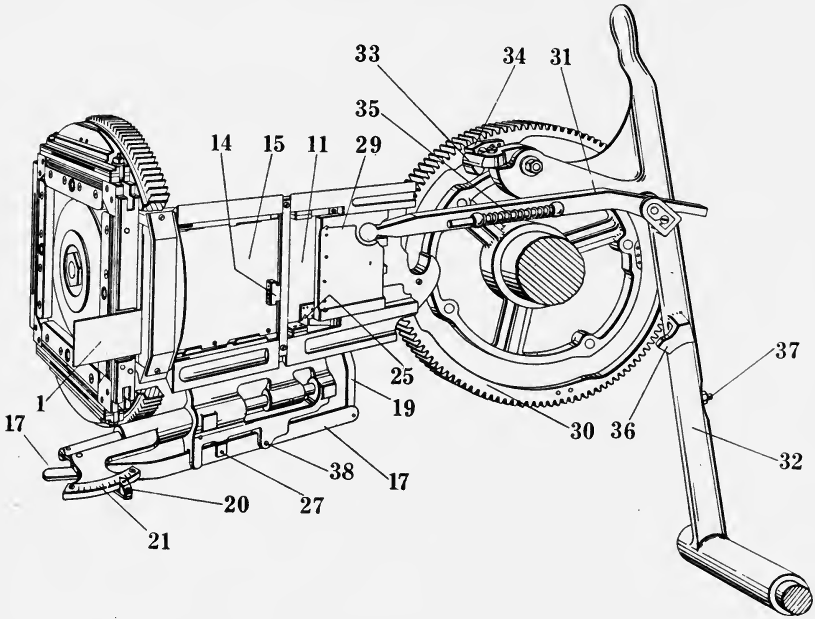


FIG. 101.—The Intertype Universal Ejector with some of the supporting parts stripped away to show how a slug is ejected from the mold. The ejector blade *1* is actuated by the ejector cam *34* when it engages the pawl *33* on the lever *32*. The lever *32* is connected to the blade *1* by a link *31*, the slide *29* and the holder or master blade *11*.

the ejector blade should clear the edge of the knife block casting at the top of the slug chute by 1/32″.

Mounted on the link *31*, between two screw-eye brackets, is a buffer rod and spring *35*. The purpose of this device is to cushion the forward stroke of the ejector slide so it will not be overthrown from momentum and will make its forward stroke exactly as compelled by the pawl *33*.

Holder Locating Adjustment.—There is an adjusting screw *37* in ejector lever *32*, the purpose of which is to locate the position of the ejector blade holder *11* when the machine returns to normal position, so that as the locating lever *17* is depressed while changing pointer *20*, the plunger on rod *19* will freely enter the locating notch *25* in the lower edge of holder *11*. This screw should be set to permit just a small amount of shake in the lever *32* when the machine is standing at normal position.

Changing the Blade.—In making a change from the 30-em ejector blade *10*, Fig. 102, to a 6-em blade *1*, it is first necessary to depress the locating lever *17*, which raises locating plunger *19* into a notch *25* in the blade holder *11*. This action positively aligns the 30-em blade *10* and the holder *11* with the keeper *14* attached to the keeper bar. While depressing locating lever *17*,

the shifter lever *20* is swung around a small arc from 30 on the scale *21* until the pointer registers with 6 (the length of blade desired). Moving the shifter lever *20* causes a shifter fork *22*, moving parallel with the mold slide, to shift the ejector magazine slide bar *18*, also in a parallel direction. Within the magazine slide bar *18*, the magazine or box *15* holding the ten blades is mounted upon four diagonal keys, the two lower ones shown at *23* (both main and detail drawings in this figure) and the two upper keys at *24* (shown in the detail drawing only). When the magazine slide bar is caused to move forward or back by the action of shift lever *20*, the magazine *15* straddling the keeper *14* is caused to move at right angles to the mold slide until the pointer on lever *20* registers with a figure on the scale *21*, which will indicate the size of the blade wanted. When this has been done, the ejector blade T-slot *39*, shown in the small detail drawing of the blade *1*, will register with the master blade or holder *11*, also shown in the detail drawing. The locating lever can now be released, after which slightly shake the pointer to make sure the changed location of the ejector blade magazine is locked.

Never attempt changing ejector blades while the machine is in motion.

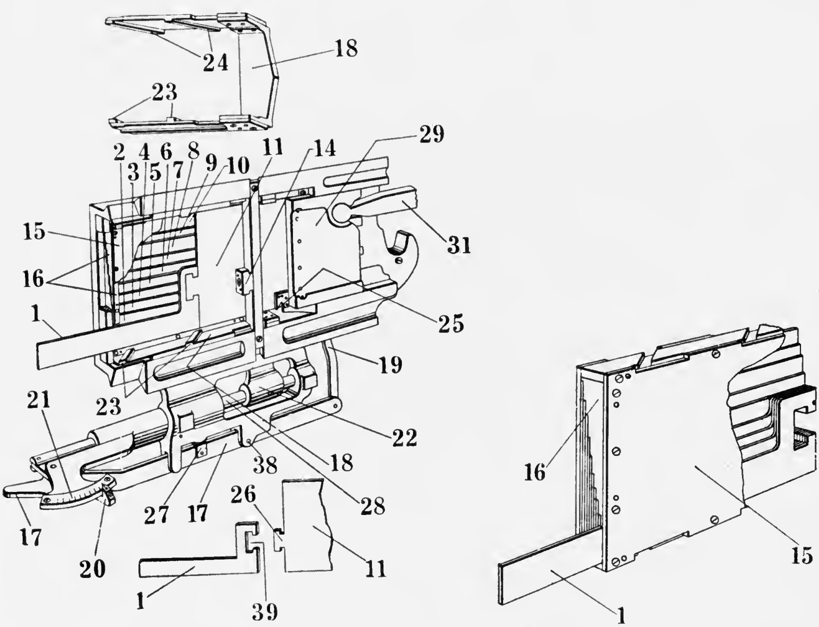


FIG. 102.—The Intertype Universal Ejector Blade Magazine is contained within the mold slide. The magazine *15* houses any selection of ten solid ejector blades. The operator can instantly change from one blade to another by depressing the locating lever *17*, and moving the indicator *20* to the number on the scale *21* which corresponds with the length of ejector blade desired.

The 42-em Intertype ejector blade magazine is similar in every respect to the 30-em magazine except that it carries twelve solid ejector blades.

Always check the setting of the ejector blade at the time the mold change is made.

Mounted on the ejector locating lever *17* is a locking plunger *27*, and a spring. The plunger *27* fits into one of a series of locking holes in the shifter rod *28* by spring pressure, so that the setting of the blade cannot slip. It is therefore necessary to depress lever *17* before the pointer *20* can be moved to make a change in ejector blades.

The stepped guide *16* must have steps corresponding to the pack of blades. If the assortment of blades is changed, the stepped guide must be changed accordingly.

If the edges of the keyed projection *26* on the master blade or holder *11*, or the inset *39* for the key in ejector blade *1*, become rounded, the two parts may separate. This can only occur, however, through willful abuse of the ejector, either by forcing an ejector blade into a shallow slug or hammering a stuck slug by manipulating the handle of the ejector lever.

Removing a "Stuck" Slug.—If a slug sticks at ejection, back the machine a trifle, raise the ejector lever pawl enough to clear the ejector cam; then let the machine come to normal position, when the slug can be removed by taking off the mold cap. It is never good practice to "pound out" a stuck slug at any time. Take measures to prevent the casting of defective slugs by keeping the metal pot full to the right level, clean the plunger daily, regulate the metal temperature properly, polish the molds, repair the mold wipers and, when necessary, sharpen the side trimming knives. If a liner has been carelessly dropped, a small burr may be thrown up at the casting edge. If this burr is not removed with a fine file or small oil stone, slugs may sometimes stick in the mold at ejection. This condition may be detected by noting whether either end of the slug has a scraped appearance. Occasionally, perhaps, a slug will stick in the mold and gentle handling of the machine will prevent injury to any of the parts.

Removal of Universal Ejector

If it becomes necessary to remove the universal ejector mechanism for cleaning, alterations when fitting in new blades, or repairs, follow this procedure: Set the ejector to the smallest blade, run the machine ahead until the first elevator rests on the vise cap and before the mold disk advances, lower the vise to second position, remove the ejector lever link, unscrew the rear mold disk stud nut, (the front nut is not to be removed, as it holds the mold disk to the stud), and remember that the rear nut has a left-hand screw thread. Take the disk and stud from the bearing. While working around the slide watch that a cut is not received from accidental contact of the hand with the back knife. This can be prevented by wrapping a wiping cloth around the knife after removal of the mold disk. Take off the ejector slide shield, mold scraper, front guide and cap, the holder guide, blade right-hand keeper, blade left-hand keeper (the screw for this is on the side next to the

metal pot); then lift off the assembled slide, set the ejector for 30 ems and lift out the ejector blade magazine or box. While the magazine is removed from its guide see that the side plates are not sprung and fit the pack of blades snugly. Reverse the above order of procedure to replace the parts.

Removing the Ejector Lever Pawl.—In order to remove an ejector lever pawl, back the machine until the ejector lever can be pushed forward, turn out the pawl screw nut, disconnect the spring from the pawl, then turn the pawl screw out until it has entered the mold cam crease. The pawl facing piece should be removed if its lower edge has become rounded and adjustment of the pawl can no longer be made. Upon replacing the pawl spring, pass a cord through the top loop and hold the top loop in position until the screw which holds the spring has been started in.

Removing the Ejector Lever.—If it is necessary at any time to remove an ejector lever, proceed as follows: With the machine in normal position, disconnect and remove the ejector lever link, loosen the first elevator auxiliary lever set screw, drive the ejector lever supporting shaft towards the metal pot side of the machine, until it has passed from engagement with the ejector lever, lift the lever out from between the cams and second elevator lever bearing. While raising the ejector lever, also turn it and rock so as to have the bearing part of the lever clear the various machine parts.

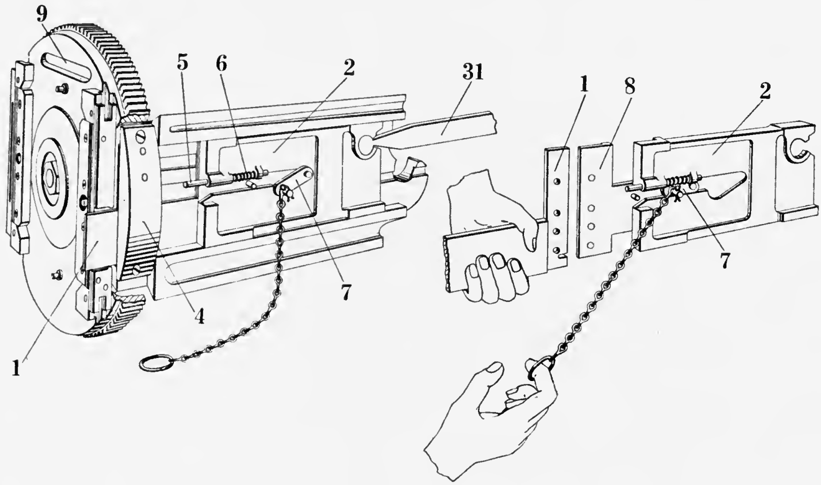


FIG. 103.—The Single Ejector. Part of the rim of the mold disk has been broken away and the mold cap has been removed to show how the ejector blade passes through the casting cell of the mold to eject a slug.

In the detail drawing the ejector blade *1*, is being placed in engagement with the pins on the holder *8* after it has been pulled forward from the slide *2* by the chain. It is necessary to change the ejector blade each time a different length of slug is to be cast.

The Single Ejector

The single ejector slide is applied to Model X machines, and was originally applied to some early A machines.

In Fig. 103 is shown a perspective view of the ejector slide *2* mounted within the mold slide recess; also a section of ejector lever link *31*, and the mold disk is broken away to show how the blade *1* is pushed forward past a guide *4* containing a steel bar with an inset brass strip which is caused to bear against the blade *1*, through pressure of two steel coil springs contained within the body of guide *4*. After a time this brass strip will have become worn down and should be replaced. It is the purpose of this strip to frictionally hold the ejector blade *1* from running ahead of the cam which causes its forward stroke through the ejector lever, the link *31* and the slide *2*.

As the slide *2* reaches its extreme forward stroke at the instant the blade *1* pushes a slug into the slug galley, the slide is prevented from overthrowing through momentum by the buffer rod *5* and spring *6*. The rod *5* strikes the guide *4*. If the spring is broken the blade may push the slug too far into the slug galley and damage the type face of the slug.

Changing Single-Ejector Blade.—In this style ejector, it will be necessary to substitute another ejector blade for the one that is in the machine when changing measures. This is accomplished by opening the vise, turning the mold disk until the slot *9* is in vertical position in front of the blade *1*. Then pull the holder *8* forward by means of the chain hanging alongside the mold slide. Pulling the chain will raise the latch *7* from its locking notch in the slide *2*. The end of the holder will project forward from the mold disk slot and the blade can be removed and another one set on the holder pins on the left side of the holder *8*.

Chapter XXI

SCREW-BEARING KNIFE BLOCK

As the slug is ejected from the mold it passes directly between the trimming knives, and from there between the vise frame and a spring plate in the front edge of the knife block which prevents the slug tipping out of line with the ejector blade. From here it is delivered into the slug galley. Some machines are equipped with an inside galley, so termed because the galley is suspended by screws on the vise frame back of the first elevator slide, and the slugs are delivered in a vertical position. Another style galley is called the inclined or outside galley and is mounted upon two brackets in front of the first elevator slide in an inclined position so that the slugs while being delivered come to rest face up in a galley after sliding down a chute provided with suitable guides.

Side knives are slightly tapered from the cutting edge to the base to the extent of one and one-half thousandths, and as the slugs are pushed between them by the ejector blade they are free to advance through the tapered opening without friction.

The left-hand knife is stationary and is affixed to the vise frame by two square-head anchor screws which enter the base of the knife from the front of the vise frame. A bow spring *22*, Fig. 104, set between the left-hand knife *20* and the right-hand mold disk locking stud block, urges the knife against two adjusting screws *4* and *4* in the knife block, when the two square-head anchor screws are loosened. This knife is intended to be adjusted to cut off any whiskers or slivers of metal from the constant side of the slug and should not gouge into the metal.

The right-hand knife is movable so as to trim the ribs of slugs to different thicknesses of body according to the size of liners in the mold, from 5 to 46 points (60-point face), by raising the detent *8* and turning dial *11* by means of dial handle *17*. The dial *11* works or turns upon a large buttress screw thread bearing forming a part of the main knife block casting. The screw also has the proper pitch so that about one-third turn of the dial will move the right-hand knife from 5-point to 46-point position.

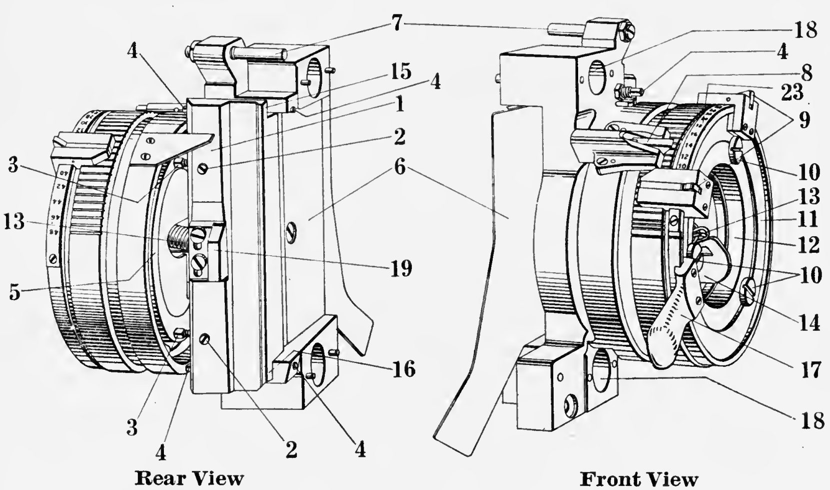
The right-hand knife "floats," that is, it is held in position by two extensions shown at *15* and *16* (back view), which rest on pads in the main casting, and the knife bears against the disk at *5* at the points where two adjusting screws *3* and *3* are located. A powerful spring *13* fastened at one end to a bracket *14* in the block screw bearing, and the other end to a hook in the knife base, holds the knife under tension against the pads *15* and *16* and in engagement with the disk *5* by the pilot screws *3* and *3*. This spring *13* also

causes the right-hand knife *1* to follow dial *5* when the lever *17* is manipulated to open the knives for trimming larger slugs.

The dial stop blocks *9* and *9* are set by the operator when composing advertising figure matter. The first slug containing overhanging figures is permitted to pass between the knives without trimming its rib side; the next slug which completes the item and fits under the overhanging figure to support it, is trimmed by the right-hand knife. The operator can set the stop blocks; one so the knife will just let the overhanging figures pass without trimming, and the other to limit the setting of the knife to trim the ribs for the second slug. The detent *8* can be left disengaged and the lever *17* merely moved back and forth as the work proceeds.

The right-hand vise jaw banks against the screw *7*, and the screw is adjustable to limit the position of the jaw, as the matrix line is justified, so letter characters will not overhang the right end of the slug body.

The three screws *10* hold the dial *11* to the knife block operating screw *12*. In case an odd knife setting is desired, the dial *11* can be slipped around the screw *12* after loosening screws *10*.



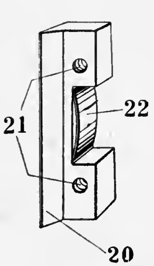


FIG. 104.—The Intertype Universal Knife Block, shown in perspective views. The dial *11* has notches in its face corresponding to the numbers on the scale *23*. When the operator desires to change the right-hand knife *1*, (back view) to another position as indicated by the scale *23* (front view) he raises the detent *8* and rotates the dial *11* by means of the handle *17* until the notch opposite the number on the scale *23* registers with the detent *8*. The detent 8 is then released so it will fit into the notch on the dial to preserve the setting of the knife.

The spring plate *6* is gently urged against the vise frame by a flat spring (not shown), and supports the slug while the ejector is pushing it from the knife block into the slug galley.

Removing the Knife Block.—The knife block can be removed from the vise frame by turning out the two screws passing through holes *18* and *18* in the block. Give the screws just a few turns, take out the half-washers from between the block and screw heads, and slide the block to the right over the screws.

Slugs Stall on the Knives.—In case the operator forgets to set the knife block when changing the slug body or thickness of the slug (larger point size), the machine will stall at ejection. Before attempting to open the knife, back the machine until the mold disk is disengaged from the stud blocks, which will permit the operator to move the right-hand knife to the proper setting. If the knife block lever is moved before the slug is backed away from the knives, the collar *5*, Fig. 104, may become disengaged from the pilot screws *3* and *3*. In case the knife block lever has been moved before the slug is backed away from the knives, the dial may be manipulated so that the holes in the dial will be put in engagement with the pilots on the adjusting screws after the disk is backed away and before the slug is ejected from the mold.

First Style Knife Block

The first style knife block is similar to the newer floating knife block, except the right-hand knife does not "float," but is fastened upon a slide head by two anchor screws, which must be loosened before the adjusting screws can be turned, after which the anchor screws must be tightened again. The left-hand knife is adjusted in exactly the same manner as the left-hand knife used on the newer knife block. The pitch of the thread used on the first style knife block operating screw is less than that of the newer style and the operation is therefore slower.

Setting the Side Knives

The left-hand or stationary knife *20*, detail drawing Fig. 104, should be first set so as to just trim off any fins or fine metallic slivers at the top of the smooth side of the slug. Loosen the two square-head anchor screws at the front of the vise frame. The two square-head center screws hold the right-hand mold disk locking stud block in place, and to loosen the left knife, turn out on the top and bottom square-head anchor screws. They screw into the knife body, indicated at *21* and *21*. The bow spring *22*, between the knife and the mold disk locking stud block, will cause the knife to follow adjustment of the screws *4* and *4* (back view of the block). Tighten the anchor screws which hold the knife to the vise frame after each manipulation of the adjusting screws *4* and *4*, and cast another slug which can be calipered with the micrometer caliper to see what effect movement of the adjusting screws has

had upon the knife. Then set the right-hand or movable knife *1* to trim the rib side of the slug. In other words, the right-hand knife setting must be exactly parallel to the left-hand knife setting.

The right-hand knife may be adjusted by loosening the jam screws *2* and *2*, and turning screws *3* and *3* a little at a time until parallelism is obtained.

After having adjusted the knives, always tighten the nuts on the adjusting screws to preserve the settings. Interposed between the jam screws *2* and *2* and the adjusting screws *3* and *3* are small round copper plugs. These plugs prevent the jam screws injuring the adjusting screw threads.

Sizes of Type.—In the setting of side trimming knives, the basis of .014″ to the point may be used, which greatly simplifies the mathematics and for all general purposes will be close enough. However, if undersize or oversize trim is desired, it is a simple matter to adjust the right-hand trimming knife.

Pearl,	5	points......	.070″	Bourgeois,	9	points......	.126″
Agate,	5½	"	.077″	Long Primer,	10	"	.140″
Nonpareil,	6	"	.084″	Small Pica,	11	"	.154″
Minion,	7	"	.098″	Pica,	12	"	.168″
Brevier,	8	"	.112″	English,	14	"	.196″

Some Notes About Knives

Knives need not be excessively sharp at their trimming edges, but if too dull, they will not trim the slugs properly. Once a set of side knives is correctly applied, and the machine is properly handled, they should last a long time without resharpening. It is a good plan to have an extra set on hand so the machine will not have to stand idle while the dull set is being ground after having been sent to the nearest agency.

Sometimes it happens that the left-hand trimming knife slips through careless handling of the machine. Before attempting to adjust the right-hand knife, loosen the anchor screws for the left-hand knife and if it has been crowded out of position, it will fly back to place against the adjusting screws through pressure exerted by the flat spring *22*, Fig. 104, between the knife and the right-hand locking stud block.

"Bottled" slugs are those that seem to trim closer at the bottom than at the top, or have no trim at all at the bottom. They are the result of the operator forgetting to set the knife block lever when changing to a smaller slug, or the left-hand knife has slipped from position, as explained above. Slugs may also be "bottled" when the right-hand knife is not set up sufficiently to trim the ribs, or the left-hand knife is not set close enough to trim off the fine slivers at the top of the slug.

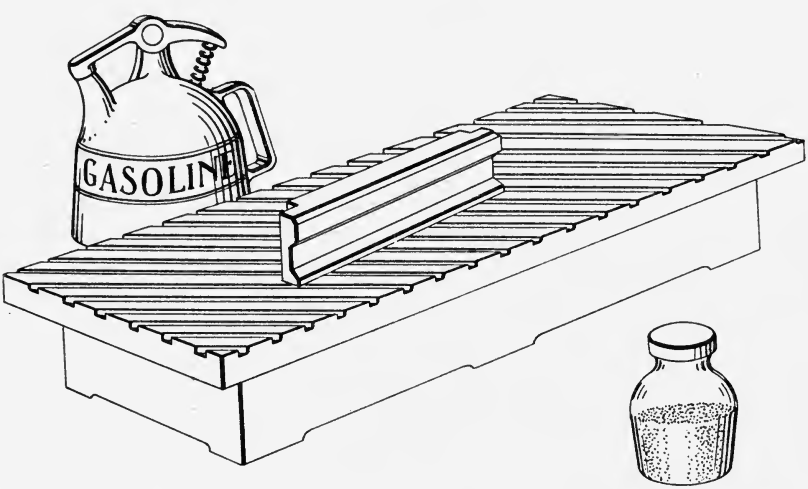
It has been previously described in the section relating to the mold slide that if the mold slide support screw is misadjusted, the ejector blade will rub the constant side of the mold body. This is also true in the case of the left-hand trimming knife, the true cutting edge of which will be ruined

should the mold slide support adjusting screw be turned so there will be no clearance between the mold body and the left trimming knife. The support screw should be set so that it just touches the mold disk guide, when the locking studs are in engagement with the stud blocks.

In the course of time the mold disk locking studs and stud blocks will wear, and the wear taking place in the right-hand block or the stud engaging it most frequently will cause a loose condition of the mold disk when in forward position. If this looseness is great enough, the mold in use will not always be positioned parallel with the trimming knives, and it will appear that the knives are out of adjustment. To determine if this condition is present, see if there is a slight movement of the mold disk teeth when the justification bar strikes the spacebands before the cast. A further test may be made by *gently* prying against the mold disk gear teeth while the disk is in forward position and the locking studs are in engagement with the stud blocks. Replacement of all four studs and possibly the blocks is the only remedy. The studs will wear much faster than either of the stud blocks.

Lapping the Knives

When the knives have become dulled, remove them from the machine. If not too dull, they can be lapped on a cast-iron lapping block, and afterwards finished on an oil stone. The lapping block is obtainable from the Intertype Corporation. A lapping block is shown in Fig. 105. If the knives are nicked



No. 120 Abrasive Powder

FIG. 105.—Cast Iron Lapping Block upon which to lap a side knife when it becomes dull. The emery powder is sprinkled over the grooved surface of the lapping block and moistened with the gasoline. The knife can then be sharpened by moving it over the emery powder and gasoline upon the block.

or have badly rounded cutting edges, it is better to send them to the nearest agency for grinding. Special equipment is required in the grinding of side knives.

To lap a side knife, sprinkle some abrasive powder, which can be No. 120 emery or carborundum, over the lapping block, and moisten with gasoline or kerosene. Rub the knife, face down, with steady strokes, back and forth over the block, and shift the position of the knife with each stroke. After the knife shows a completely ground surface, finish on a medium-grade oil stone. Particular care should be exercised to see that the grinding surfaces of both block and stone are true. Don't forget to rub the bevel or top side of the knife a number of strokes with the stone. The left knife can be laid directly on the stone upside down and given a few rubs. Remove any wire edges with the end of a pine stick.

Return the knives to position on the machine and adjust them as instructed in the preceding paragraphs. Be sure that all of the ribs caliper exactly the same (always caliper the ribs) and in case of difference in measurement, use a small slip stone and carefully rub it inside the knife at the exact spot where the micrometer shows the slug to be "thin."

Setting the Right-Hand Mold Banking Block.—After application of a new or resharpened right-hand trimming knife, it will be necessary to set the mold banking block *19,* Fig. 104. Since the block is adjusted by sliding it up or down upon a tapered bearing, the best method to use in adjusting it will be to pull the mold disk forward until the mold banks upon the upper and lower banking blocks. Next place two pieces of ordinary newspaper between the mold cap and the adjustable banking block; slide the banking block up to the point where it will hold the two pieces of paper, but not tight enough to hold one thickness of paper; then tighten the screws which hold the banking block to the knife.

Best results will be obtained if the right-hand knife banking block is set about .002″ lower than the upper and lower banking blocks.

Chapter XXII

THE KNIFE WIPER

The knife wiper consists of a bar or rod and suitable guides mounted in the vise frame and is operated through the action of the first elevator slide. The blade part or scraper of the knife wiper is a small brass plate fastened to the top of the bar and projecting at right angles, so that it covers both cutting edges of the knives.

As the slugs are pushed between the two side knives for trimming to size, some of the shavings adhere to the knife edges and the knife wiper is provided to remove them.

The first style wiper bar *1,* illustrated in Fig. 106, is made from square stock and has an offset bend at *11.* A bar guide *8,* having two projections, into which the bar fits, keeps it in line vertically. A guide bracket *3,* having a springy bearing, holds the upper end of the bar *1* down upon the left-hand trimming knife *13,* which causes the wiper blade *2* to scrape off any metal shavings from the knives. The wiper blade *2* is caused to wipe or scrape the edges of the trimming knives when the lever *7* causes the first elevator to go down to casting position, and when it rises to transfer position.

Operation.—As the elevator is lowered to casting position, the slide stop *6* projecting from the lower end of the first elevator slide and engaging the lower end of the rod *1,* bears against adjusting nuts *5.* When the first elevator is resting on the vise cap, there should be ⅛″ play in the wiper rod *1.* This adjustment is obtained by the nuts *5.* When the first elevator rises to transfer position, the stop bar *6* bears against the spring *4,* which causes the rod *1* to also rise, and the wiper blade *2* goes to the top of the trimming knives and is pulled part way down again as the first elevator comes to normal position. The wiper, however, does not drop entirely down, as the bar guide bracket *3* suspends the rod through spring pressure.

The stop pin *9* limits the upstroke of the wiper bar by banking against the underside of guide lug *8,* and if there is any excess overmotion of the stop bar *6* it is taken up by the spring *4.* Stop pin *11* limits the downstroke of the bar by banking on top of bar guide lug *8.* At *12* is shown the lower mold banking block.

If lubrication of the underside of the bar guide bracket *3* has been neglected, or its tension against the bar *1* is too strong, a groove will be cut in the bar at *11,* and the bracket *3* will not hold the wiper blade down upon the knife edges properly. In this case, during an emergency the groove can be filled by welding, then dressing to original size again.

It is important that a slight bend (about 10 degrees) be kept in the upper end of the wiper bar, that is, commencing at the offset shown at *11,* the upper

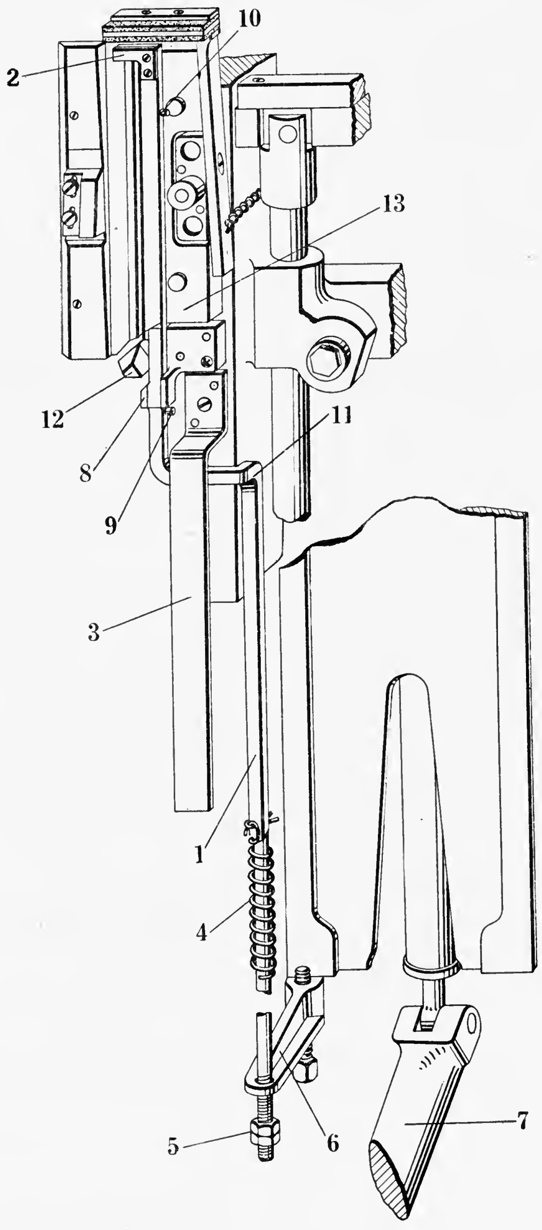


FIG. 106.—First Style Knife Wiper. The wiper blade 2 is caused to remove the shavings from the slugs which adhere to the knife edges as the slug is pushed between the knives by the ejector blade.

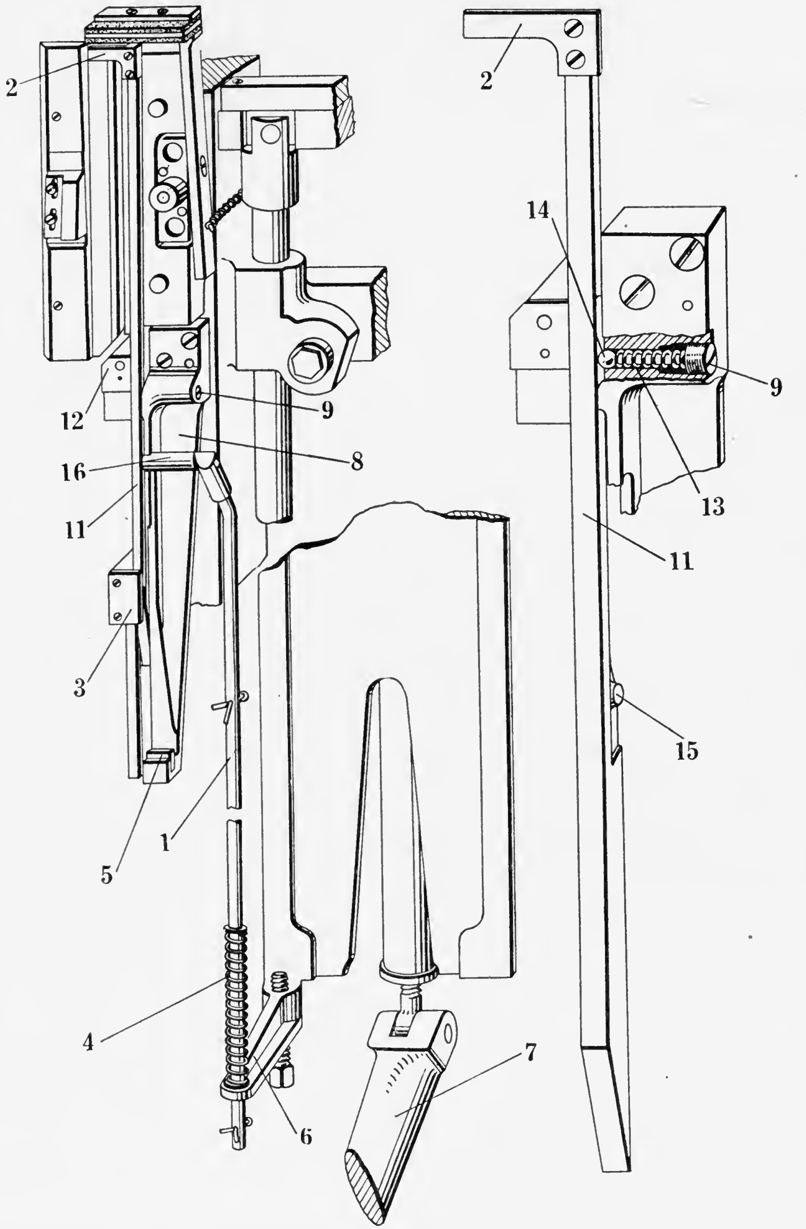


FIG. 107—New Style Knife Wiper for the 30-em machine. The wiper blade 2 removes the shavings from the side knives, which trim the slug to the size for

which the knives are set. Some of these shavings adhere to the knives when the slug is trimmed by the action of the ejector blade pushing the slug between the knives. The knife wiper *2* attached to the bar *11*, the stud *12* and the rod *1* is operated through its connection with the various parts by the stop bar *6* on the first elevator slide.

part of the bar *1* should be slightly bent down out of line with the lower part, and toward the knives. This is necessary on account of the shear or receding edges of the side knives and will cause the wiper blade to follow evenly over the cutting edges.

New Style Knife Wiper

The new style knife wiper operates in an elongated guide which is a combination of knife wiper bar guide, *8*, Fig. 107, and the mold lower banking block *12*. The bar *11* is sustained in the guide by a plate or gib *3*. The wiper blade *2* is exactly similar to the first style wiper blade.

Operation of the wiper is compelled by the stop bar *6* when the lever *7* causes the first elevator to descend to the vise cap through contact with the cotter pin at the lower end of rod *1*. As the first elevator seats upon the vise cap, stud *16* strikes a block *5* in the lower end of guide *8* limiting the downstroke of the wiper rod. When the first elevator rises through action of lever *7*, stop bar *6* presses upwards on spring *4*, causing bar *11* to rise through its connection with rod *1* and stud *16*. As the first elevator seats at transfer, a detent *15* in bar *11*, shown in the detail drawing, engages a protruding ball *14* which holds the wiper suspended at top position, after the elevator has descended from transfer and while the ejector blade is making its back stroke after delivering a slug. The action of holding the bar by this detent and spring ball keeps the wiper blade elevated so that it will not be injured by the ejector blade. The screw *9* should be turned in far enough against the spring *13* so that when the detent *15* in the bar *11* engages the ball *14*, the wiper *2* will be held up without dropping after the first elevator has come to normal position.

Knife Wiper for 42-Em Machine

The 42-em knife wiper functions exactly like the 30-em wiper. It operates from the stop bar extension at the lower end of the first elevator slide.

When the first elevator rises to transfer position, the stop bar extension *6*, Fig. 108, presses upward against the spring *4*, and the blade *2* wipes the knife edges free of metal shavings trimmed from the slugs. As the mold disk comes forward to ejecting position, it bears against the upper end of the detent *7*, which throws the lower end of the detent under the offset bend in the rod *1*. This detent holds the wiper clear of the ejector blade so the wiper *2* will not be cut. After the mold disk has retreated, the spring *8* pulls the lower end of the detent *7* from under the rod *1*, which is then free to operate again.

At *12* is shown the lower mold banking block which forms a part of the upper knife wiper guide, and *3* represents the bar cover or gib to hold the rod *1* in place. The lower guide *9* is fastened to the lower right extremity of the vise frame.

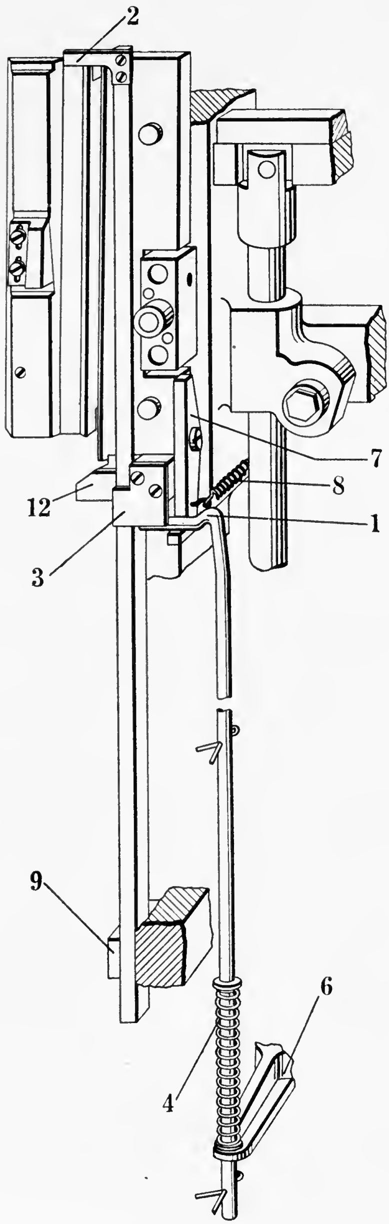


FIG. 108.—The 42-em Knife Wiper. This knife wiper is operated in the same manner as the knife wiper for the 30-em Intertype.

Chapter XXIII

THE SLUG GALLEY

Two forms of slug galley are used, both of which receive the slugs immediately after the ejector blade has pushed them through the trimming knives.

The inside or vertical galley *1,* Fig. 109, is suspended between the vise frame and the first elevator slide to the left of the knife block, upon two flat-head screws *3* and *4* in the vise frame. Suitably shaped holes having beveled edges corresponding to the bevel on the screw heads permit the galley or "stick" to be hung upon the screw heads.

As the slugs are delivered from the knife block into the galley *1,* they are pushed to the left by the slug lever *2* and are held upright by a sliding angle piece or support 7 which slides frictionally in the bottom of the galley. The slug lever is actuated by a roller mounted in the first justification rod collar shown in the small detail drawing, for outside slug galley at *10,* Fig. 110, through a connecting rod *9*. The spring *11,* Fig. 109, pulls the slug lever to the left against the connecting rod and the roller in the first justification rod collar which actuates the lever during justification of the matrix line so as to jog the slugs and make room for the next slug to be delivered into the galley.

The inside galley, *1,* Fig. 109, has mounted upon its right-hand side a spring *5,* which is flexible and gives in case the preceding slugs have not been pushed to the left by the slug lever *2*. Upon a lug of the slug lever *2* there is a screw *6* which can be turned to govern the length of the stroke of the lever to properly push the slugs into the galley.

As explained in the section relating to the forward stroke of the ejector slide, the ejector lever pawl should be set by means of its adjusting screw so that the ejector blade will advance 1/32" beyond the edge of the galley. Also the ejector slide buffer spring and rod in the forward end of the single ejector slide should be kept in proper repair. Otherwise the ejector blade will push the slugs into the galley spring *5* and damage the type face of the slugs.

Outside Slug Galley

The outside galley *1,* Fig. 110, rests upon two brackets, *2* and *3*. The angle piece *12* is frictionally held to the galley *1* by a spring clip.

Adjustment of the slug lever 7 is made by a screw *8,* so that while the lever is in position before the slug is delivered, the buffer face of the lever 7 will be a little to the right of the bracket guide *5*. When the guide is properly adjusted slugs will travel down the chute and come to rest in the galley.

The slug buffer *4* is suspended from a hinge at the top of the chute and is free to swing out at its lower end. Its construction is such that it causes all sizes of slugs to be crowded down upon the chute bottom.

The bottom plate or spring in the chute should be polished every day with a pine stick and some kind of grease, preferably the stick form of mold wiper polish, so as to remove the lead coating which forms due to friction as the slugs slide over the plate.

A thin, springy chute guide *13* is provided, which can either be turned down for short-length slugs to help guide them into the galley or turned up out of the way when casting long slugs.

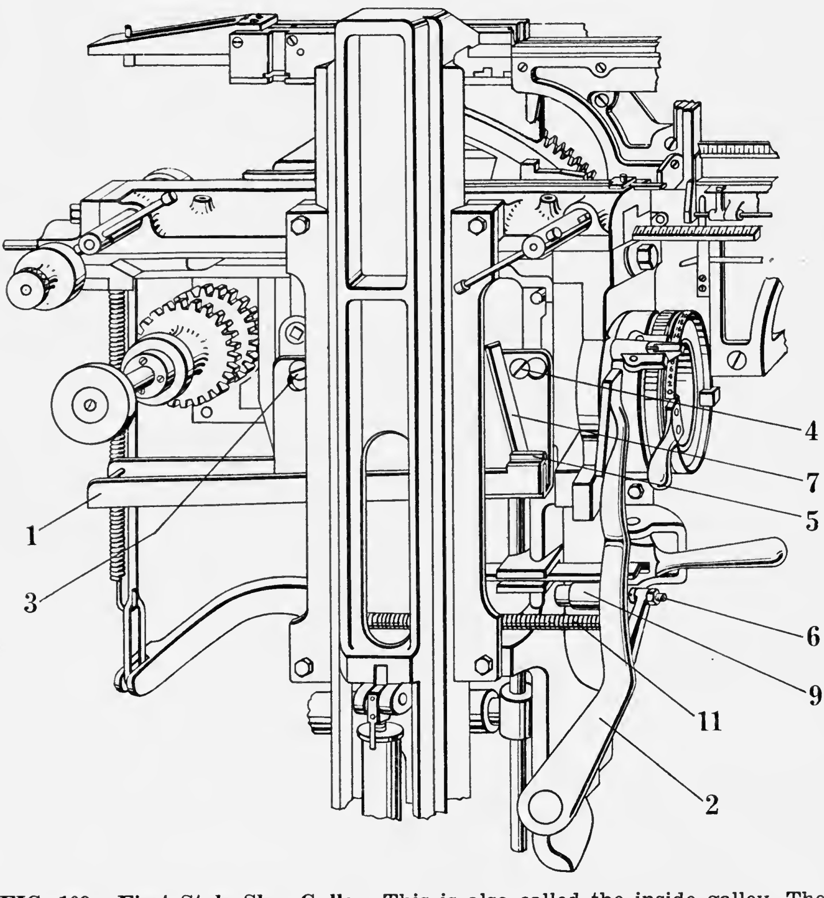
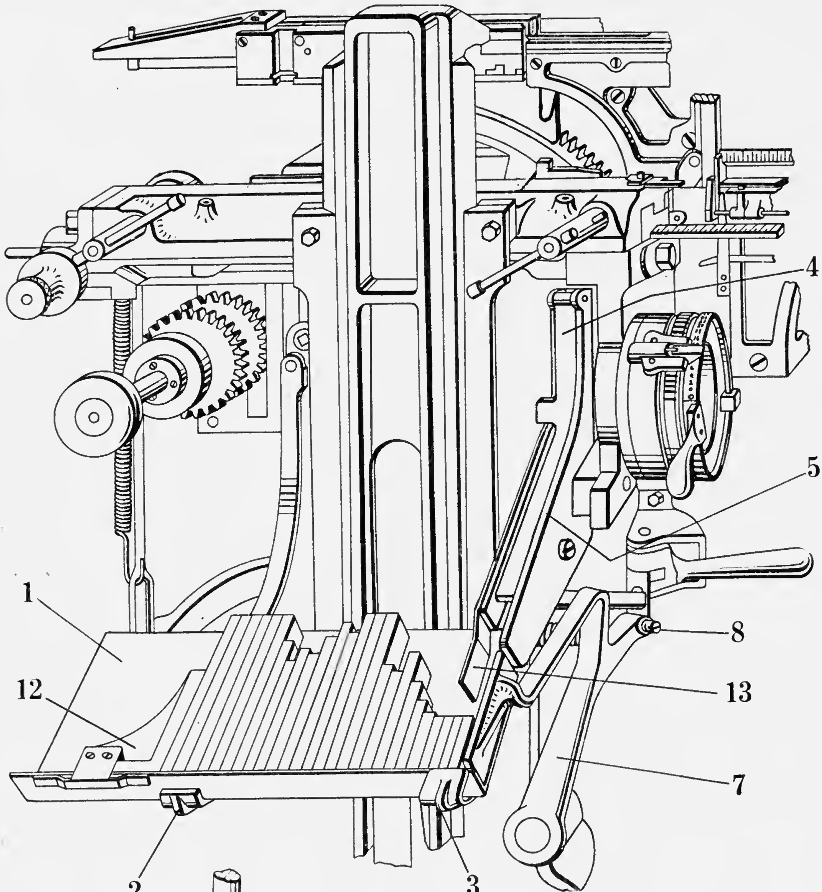


FIG. 109.—First Style Slug Galley. This is also called the inside galley. The slugs are delivered in a vertical position by the ejector blade to the galley *1* and are supported by the angle piece 7. After each slug is delivered into the galley, the slug lever *2* jogs the preceding slugs, so as to move them out of the way of the slug which will be delivered next.



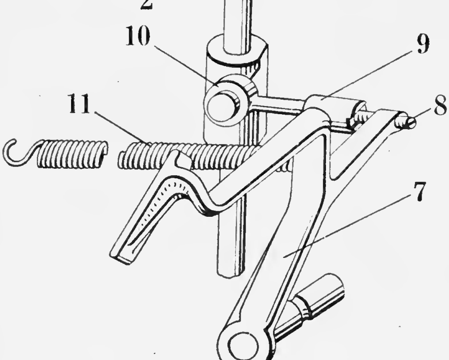


FIG. 110.—Intertype Outside Slug Galley. The slugs are delivered face up on the galley which makes their removal convenient without disturbing the operator.

When the ejector blade pushes the slug (which is in a vertical position), to a point back of the guide *4*, the slug will slide by gravity down the chute and into the galley with the preceding slugs. While the slug is passing through the chute it is caused to turn from a vertical position by the slope of the chute and the pressure of the guide *4*, so that when it comes to rest in the galley it will be face up.

The lever 7 jogs the slugs to the left after each one is delivered, so as to provide room for the next one to slide into place.

Chapter XXIV

TRANSFER MECHANISM

After a slug has been cast in the mold, the mold disk revolves through three-quarters of a revolution, past the back knife which trims the jet projections and vent sprues from the slug so it will be type high, and stops with the mold containing the slug in a vertical position in front of the side trimming knives, when the ejector pushes the slug from the mold, between the knives where it is trimmed to size, and delivered to the slug galley.

After the completion of casting a slug in the mold, the distributing mechanism or third main unit of the machine commences to function. The first elevator ascends, carrying with it the matrix line, until it reaches the transfer channel. As soon as the matrix line is unlocked from the vise jaws and mold, the long spaceband wedges as a rule drop down until they are in normal position. Should any of them remain up in justified position, they are forced down by a beveled bar in the cap at the left of the transfer channel while the first elevator is being seated at transfer position. At the instant of arriving at transfer position, an operating bar is engaged by the first elevator duplex rail, which causes the rail to be retracted, so that any matrices that have been assembled in high alignment or auxiliary position as explained earlier in the book, will drop down to normal position. In this way, all matrices and spacebands are brought to a common level for transfer from the first to the second elevator.

While the first elevator makes its upward stroke to transfer position, the second elevator leaves its normal position at the entrance of the distributor and descends until its flexibly fastened bar rests upon the transfer channel. The bar, provided with continuous grooves or teeth corresponding to the matrix teeth, is now ready to receive the line of matrices, the teeth of which will engage the toothed elevator bar for the purpose of lifting the matrices up to the distributor.

The line containing matrices and spacebands will be shifted to the second-elevator bar by a finger attached to the transfer slide, after which the finger will retreat from the transfer channel, and the second elevator will lift the matrices from the transfer channel. At this time, the first elevator will start descending from transfer to normal position.

The spacebands, having no combination teeth, are not lifted up by the second elevator, but remain in the transfer channel, until the second stroke of the transfer slide finger takes place, when they are pushed to the right under the spaceband transfer lever pawl. The underside of the pawl is recessed to form a hook which engages the spaceband lugs. The spaceband transfer lever is attached to the transfer lever by a turnbuckle and movement

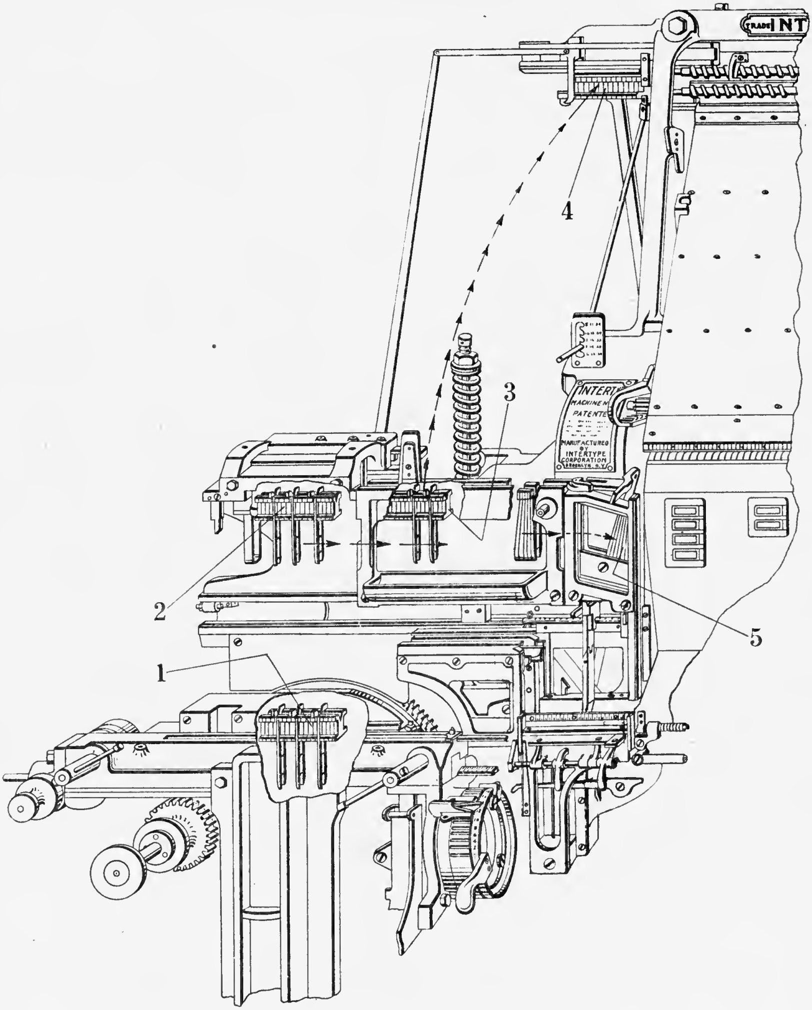


FIG. 111.—The Distributing Mechanism. This view represents a matrix line before the mold just after a slug has been cast. The mold disk will now be revolved through three-quarters of a revolution to present the mold (containing the slug) in a vertical position opposite and parallel to the trimming knives. During the time the mold disk revolves, and while the slug is being ejected, the matrices are automatically conveyed to the distributor and the spacebands are returned to the spaceband box.

Starting from point *1* where the slug was cast, the line of matrices and spacebands is carried upward by the first elevator to point *2*, and is then shifted horizontally to point *3* as indicated by the arrows. The matrices are separated from the spacebands at point *3* when a long arm called the second elevator lifts them up to point *4*, where they enter the distributor. At the same time the spacebands are transferred from point *3* to point *5*, which is the spaceband box (indicated by the dotted arrow).

of the transfer lever causes the spaceband transfer lever to move in the opposite direction. As the spaceband transfer lever conveys the spacebands to the spaceband box, the transfer lever returns to normal position at the left of the transfer cap. The second elevator bar meanwhile has reached its seat at the left side of the distributor, where the matrices will be pushed into the distributor box by the shifter.

The Transfer Channel

Referring to Fig. 114, the back plate of the transfer channel is shown and the front plate is broken away, in order to explain the functions of the various parts. As the spacebands slide into the channel *27*, their slotted lower ends straddle the rail *36* to prevent the lugs or ears at the upper end of the sleeves twisting out of engagement with the grooved rails in the tops of the front and back channel plates. As a further protection so that spacebands will not twist sidewise while being transferred into the transfer channel from the first elevator, a tilting friction weight *33* pivoted on screws at *34* and *35*, engages the spacebands and causes them to drag slightly.

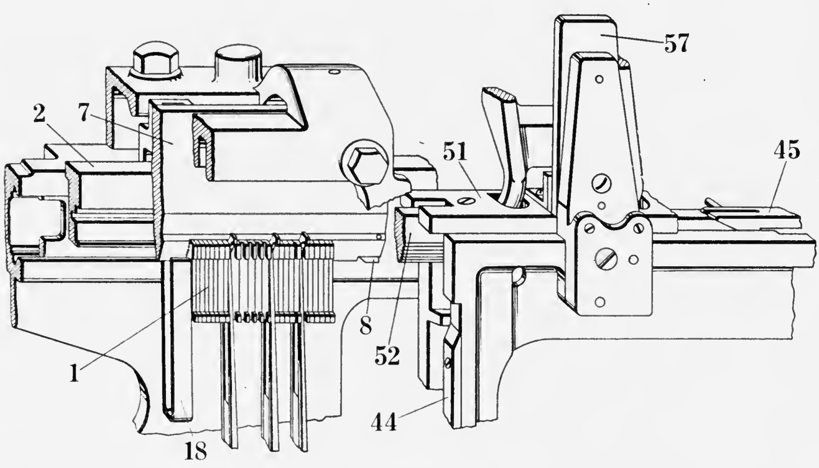


FIG. 112.—Transfer Position of the First and Second Elevators. Parts have been broken away to show the matrix line *1* and the second elevator bar *52*. As the first elevator *2* comes to its seat at the transfer channel, the transfer bar *7*, having a beveled lower edge, depresses any of the spacebands that may not have fallen while the first elevator was rising from casting position to transfer position. As the line *1* is shifted, the pawl *8* in the bar *7* prevents matrices or spacebands rising above the common level and assures a smooth transfer to the second elevator bar *52*.

The second elevator *51* having an angle piece (*54*, Fig. 123), resting against the lower guide plate *57* (this figure), stops in the same place each time it comes to rest upon the transfer channel. This lower guide plate *57* is adjustable to regulate the position of the toothed second-elevator bar *52* so that it will register exactly with the matrix teeth.

The guide plate *40,* Fig. 114, mounted upon the rear edge of the back plate *27* is intended to assist in locating the second-elevator bar plate so that the second-elevator bar which is fastened to the bar plate, will be positioned exactly the same each time it comes down upon the transfer channel. After the proper adjustment of the second-elevator bar in relation to the first elevator has been made so that matrix teeth will match the teeth on the bar, the guide plate *40* can be set by screw bushings under the screws *41* and *42* so there will be .005″ play between the front edge of guide *40* and the rear edge of the second-elevator bar plate while the second elevator is seated upon the transfer channel.

Adjustment of the Guide Plate.—In order to make adjustment of the guide *40,* Fig. 114, which will not need resetting except at long intervals, determine approximately how much play exists between the bar plate and guide, and remove the holding screws *41* and *42.* It will be necessary to take off the transfer channel front plate after removing the three screws *28, 29* and *30,* and the tumbling box *32,* also held by the screws which fasten the two channel plates together. Underneath these holding screws *41* and *42,* and threaded into the channel back plate, will be found two bushings, one of which is shown at *43.* Adjust the bushings until two thicknesses of paper (which will approximate .005″) can be passed between the guide and bar plate.

Transfer Channel Stop Blocks.—Mounted in both the front and back plates are small stop blocks, the rear one of which is shown at *39,* Fig. 114. These stop blocks prevent end matrices from sliding off the right-hand end of the second-elevator bar during transfer.

Transfer Channel Quad Box.—The open space *38* in rail *37* is to permit logotypes, thin spaces, or special character matrices with blanked-out tooth recesses, to drop into the quad tumbling box *32* as the line is being transferred from the first elevator. In dropping, they strike the top of the spaceband friction weight *33* which deflects them into the tumbling box.

Rail *37* also serves the purpose of furnishing a support for matrices as they slide along the second-elevator bar during transfer.

Screws *31* and *31* fasten the transfer channel to the machine face plate.

Care of the First-Elevator Duplex Rail

The first-elevator duplex rail ordinarily requires no attention except to see that a trace of oil is applied weekly to the operating bar sides which engage the slot in the first-elevator front jaw, and also on the duplex rail return plate *44,* Fig. 112, at the left side of the transfer channel.

It may be necessary to remove the duplex rail from the first-elevator front jaw if it works sluggishly. A good cleaning and final polishing with dry graphite will be sufficient to cause the rail to work freely.

Straightening the Duplex Rail.—In case of accident, the duplex rail *3,* Fig. 115, may become bent or kinked. Remove the first-elevator head and

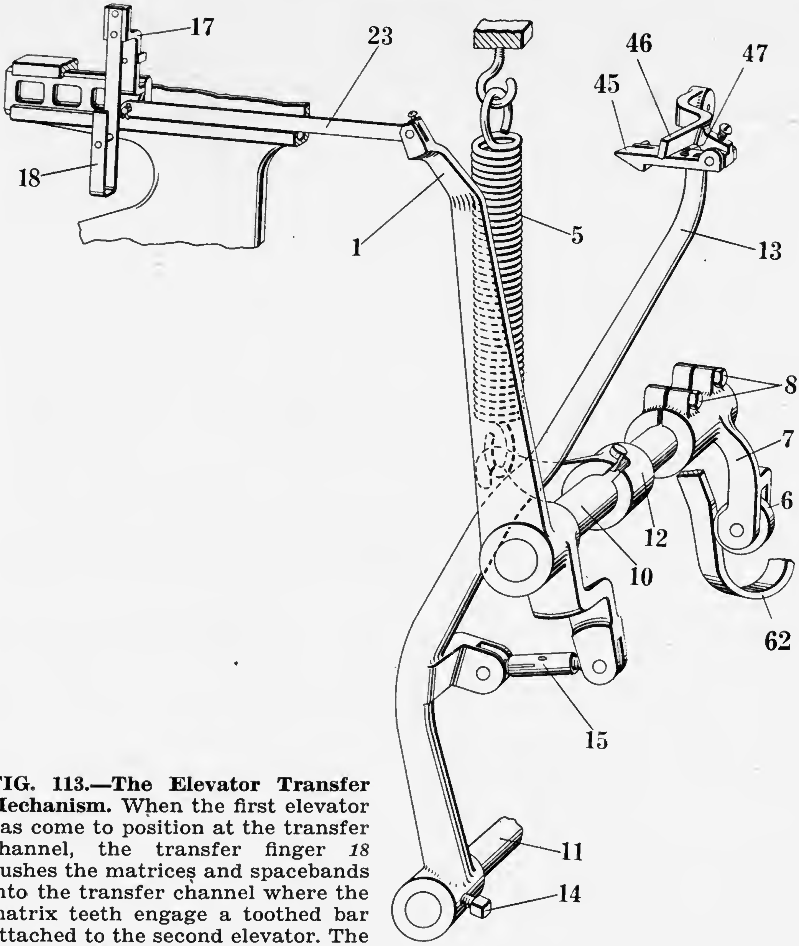


FIG. 113.—The Elevator Transfer Mechanism. When the first elevator has come to position at the transfer channel, the transfer finger *18* pushes the matrices and spacebands into the transfer channel where the matrix teeth engage a toothed bar attached to the second elevator. The finger *18*, fastened to the slide *17* is caused to transfer the matrix line by the lever *1* through its link connection *23*. The lever *1*, fastened to shaft *10* pivoted in the machine column and running through to the back of the machine, receives its movements from the elevator transfer cam *62* by an adjustable arm *7* and arm roller *6*. As the cam revolves, the roller *6* must follow its irregular surface because of the tension exerted by spring *5*. The spring is suspended from a hook in the top of the machine column and engages a spring arm *12* pinned to shaft *10*.

Attached to and forming a part of the transfer lever mechanism is another lever called the spaceband transfer lever *13*, which, by means of pawl *45*, returns the spacebands to the spaceband box. The pawl is recessed to form a hooked projection at the under side. This lever *13* is fastened to shaft *11*. A turnbuckle *15* links the elevator transfer lever *1* and the spaceband transfer lever *13* together. The spaceband transfer lever only moves when compelled to do so by movement of the transfer lever *1* through its turnbuckle connection *15*, and then in a direction opposite to that of the transfer lever.

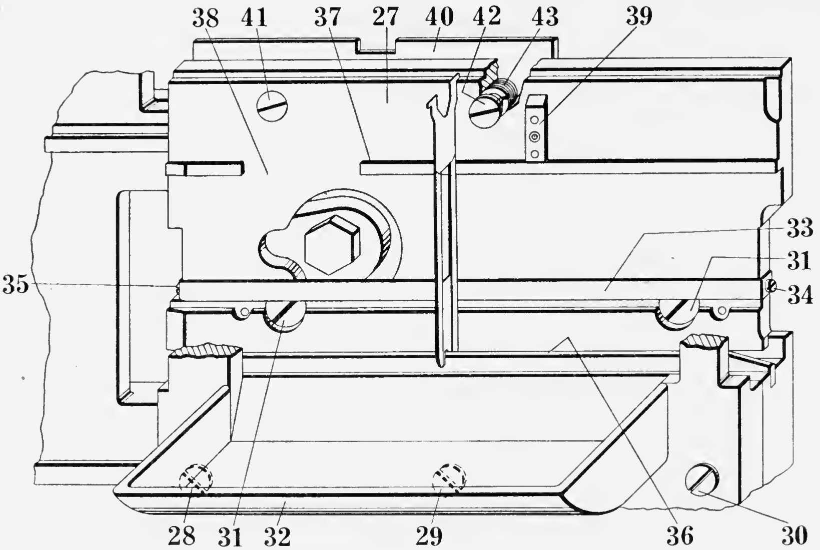


FIG. 114.—The Transfer Channel. The front plate of the transfer channel has been broken away to show the function and adjustment of the various parts.

take the screws from the duplex rail cap *5*. If not too badly distorted, the rail can be straightened. Locate the kinks with a long piece of brass rule, or if available, use a regular steel straight edge. These kinks can be "squeezed" out by placing the rail in the jaws of a large vise, having a brass piece at each end of the kink on one side of the rail and one brass piece on the opposite side of the rail about midway between the ends of the kink. Gently squeeze until the straight edge shows the kink to have been removed. Sometimes considerable patience will be required to remove the bends in the duplex rail.

Transfer Mechanism Safety Devices

Two safety devices are affixed to the transfer mechanism, one of which causes the machine to stop if the second elevator does not seat properly upon the transfer channel, and the other causes the machine to stop if the first-elevator slide does not make its full upstroke. Both of these safeties prevent spilled matrix lines.

How the Distributor Causes the Machine to Stop.—The second elevator is held up at the distributor when matrices have not been fed into the distributor and its bar is clogged. When the machine comes to transfer position under this condition, a safety lever *15*, Fig. 116, is not depressed by screw *55* in the second-elevator lever *49* so as to clear a block *19* in the transfer slide *17* about 1/32″. The lever *15*, blocking the transfer slide *17* holds up the

transfer lever and the safety pawl in the rim of the delivery and elevator transfer cam (cam No. 10) rests upon the upper stopping lever in the clutch mechanism, which causes the clutch to be thrown out of action, and the machine will come to a stop.

Starting the Machine after a Distributor Stop.—When undistributed matrices block the second elevator at the distributor, it is customary to latch the spaceband transfer lever pawl. The distributor can be started after removing the cause of the stop, then let the second-elevator lever down to the transfer channel by hand, when the screw *55* in the second elevator lever *49* will depress the safety lever *15*, clearing the block *19* on the transfer finger slide *17* by 1/32″. The spaceband transfer lever pawl can now be unlatched and the machine set in motion again when the transfer lever arm cam roller will push the automatic safety pawl clear of the upper stopping lever.

Elevator Transfer Slide Safety Catch.—If the operator forgets to turn back the first-elevator slide recasting block at the lower right vise frame bridge, or if a spaceband, matrix, bent knife wiper rod or other obstruction prevents the first elevator making its full upstroke, the lug *22*, Fig. 116, on the safety catch resting in a notch in the transfer finger slide *17* will not be

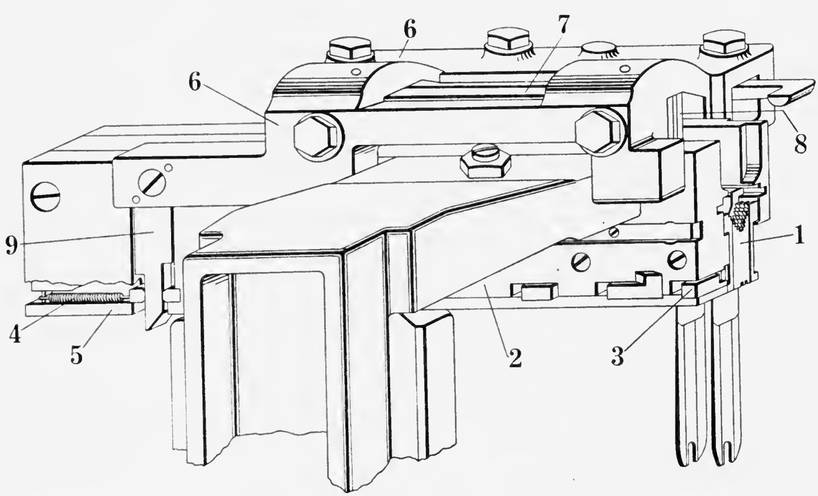


FIG. 115.—The First Elevator at Transfer Position. The duplex rail *3* is retracted to permit the matrix line to drop to normal position. The end matrix is shown at *1*. As the elevator comes to position, the operating bar *9* in the slide guide *6* is engaged by the duplex rail *3* in the first-elevator front jaw, which retracts the rail at an angle of 45 degrees from under the matrices. As the elevator *2* descends, the left end of the duplex rail *3* engages the duplex rail returning plate *44*, Fig. 112, fastened to the left end of the transfer channel. The spring *4*, (this figure) assists in returning the duplex rail *3*, although its main function is to hold the duplex rail in normal position except when the operating bar *9* causes the rail to be withdrawn from under the matrices in upper alignment position at the point of transfer.

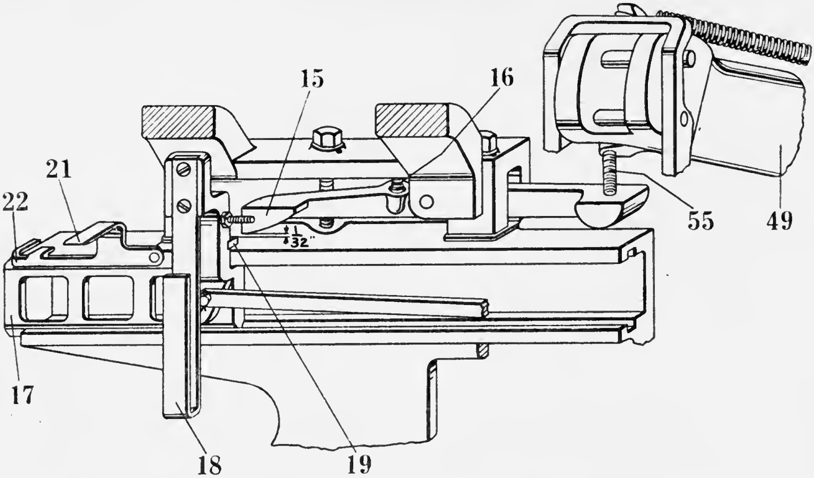


FIG. 116.—Elevator Transfer Slide. When the second elevator lever *49* has caused the second elevator to be seated upon the transfer channel, the screw *55* depresses the releasing lever *15* which clears a block *19* in the transfer finger slide *17*. The slide then is permitted to push the matrix line by means of the finger *18,* from the first to the second elevator. While the second elevator is seated upon the transfer channel there should be 1/32″ clearance between the releasing lever *15* and the block *19* on the transfer slide *17*. When the second elevator is held up at the distributor because of a distributor stop, or is prevented from seating fully on the transfer channel, the releasing lever will not be depressed to clear the block on the transfer finger slide and the machine will come to a stop.

lifted by the action of the first-elevator jaws pressing upwardly on extension *21* and the transfer will be held out of action. As long as the transfer lever is held from making its transfer stroke, the cam roller attached to the transfer lever shaft arm at the rear of the machine column will not be permitted to push the automatic safety pawl in the transfer cam clear of the upper stopping lever in the clutch mechanism and the machine will stop. The machine can be started again as soon as the obstruction to the full upstroke of the first elevator slide has been cleared away.

Second Elevator Cam Lever Adjustment

On machines A, B, C, D and X, the cam roller *2*, Fig. 117, should clear the second-elevator cam depression *5* about 1/16″ when the elevator is resting upon the transfer channel. This adjustment is made with the nuts *4*. As the second elevator seats at the distributor, the spring *3* is compressed so that the elevator bar will seat itself with a cushion stroke and will be held positively in position. There must be clearance between the cam roller and the cam at transfer position to permit the second elevator to seat fully upon the transfer channel, so the matrix teeth will not be damaged when the line is shifted from the first elevator to the second-elevator bar.

The lever weight *6* is affixed to the second-elevator lever shaft and causes the second elevator to follow its cam contours.

Mixer Machine Second Elevator Lever

The Mixer machine distributor is about five inches higher in position than the distributor on the other Intertype equipments. It is therefore necessary to lengthen the second-elevator lever. This is accomplished by using a suitable bracket and modified design of lever. This lever, like the one used on the other equipments, seats at the distributor with a cushion stroke, through spring *3*, Fig. 118. When the lever is resting at transfer position and the cam

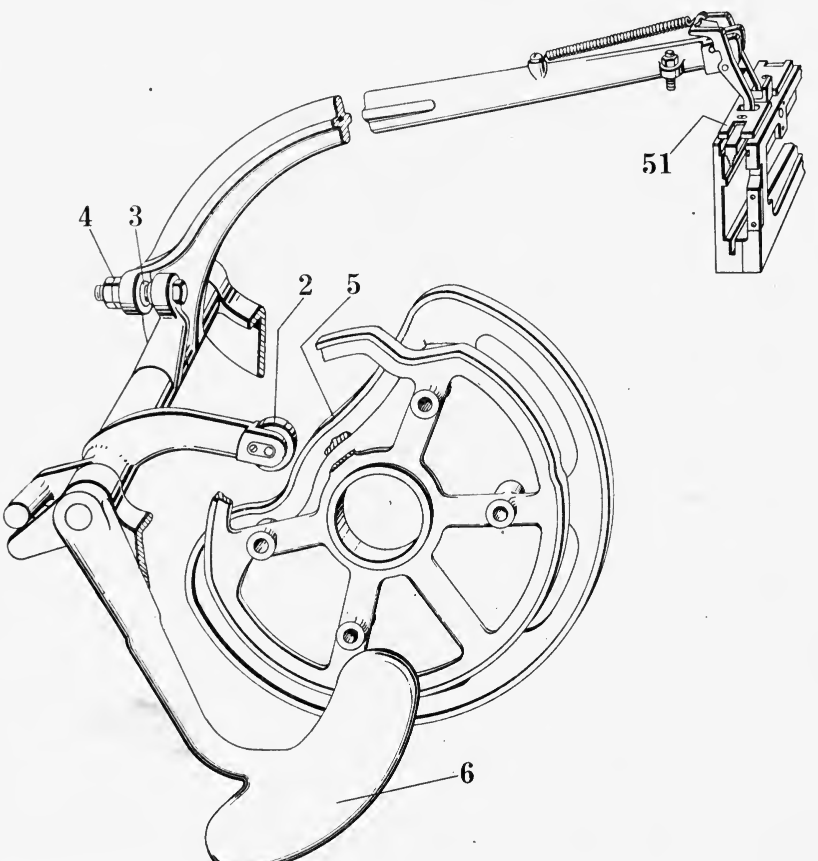


FIG. 117.—View of the Second Elevator *51* seated upon the transfer channel. The cam *5* governs the movements of the second elevator. The lever weight *6* causes the second-elevator lever cam roller *2* to follow the surface of the cam *5* as it revolves.

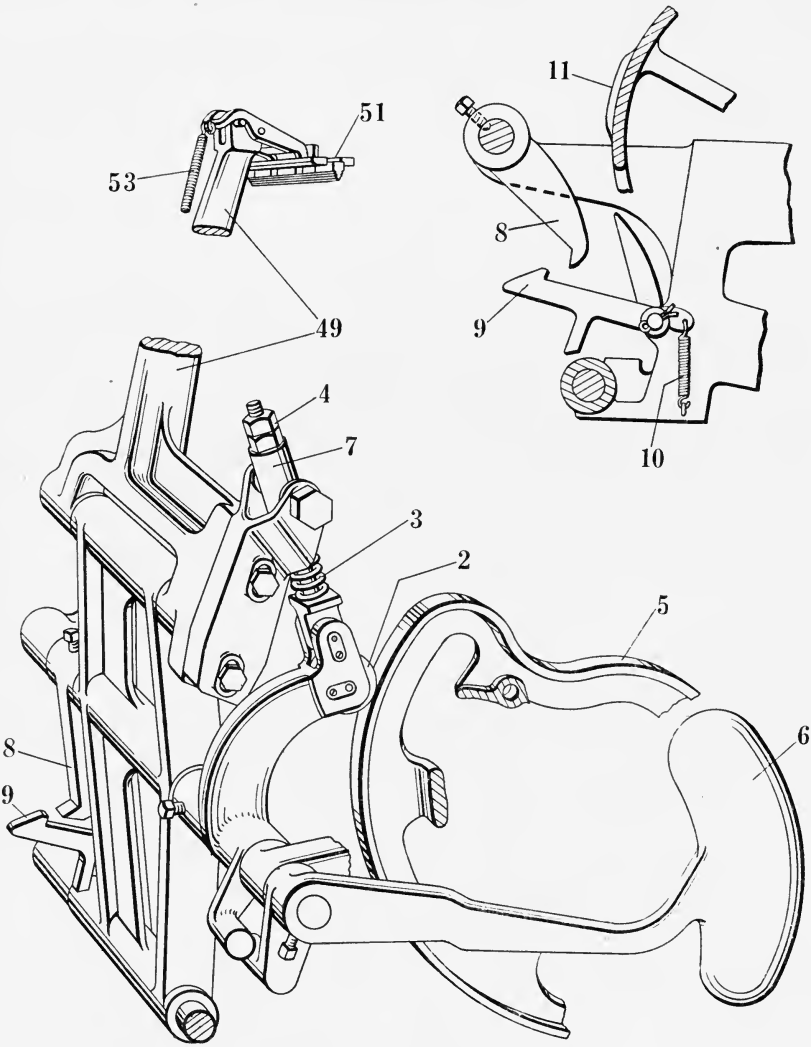


FIG. 118.—Mixer Machine Second Elevator. When the second elevator *51* is resting upon the transfer channel, the cam roller *2* must clear the dip in the cam *5*, to permit the matrix line to transfer freely from the first to the second elevator. The spring *3* provides a means for the second elevator *51* to seat at the distributor with a cushion stroke.

roller *2* is over the dip in the second-elevator cam at *5*, it should be free to revolve and not have contact with the cam.

There is a means of adjustment to properly set the lever for both of these positions. When the lever *49* is holding the second elevator at its seat with

the distributor box in the back distributor position, there should be a slight compression (1/64″) between the cam lever link sleeve *7* and the adjusting nuts *4*.

The Safety Pawl, *9*, shown in the detail drawing, is pivoted on a shaft in the right-hand cam shaft bracket. An arm *8* engages the hook on pawl *9* in case of a distributor stop and it is desired to hold up the second-elevator lever near the distributor box. Normally, the pawl *9* is deflected downwardly and clear of the arm *8* fastened to the second elevator cam lever by the action of a pad *11* on the elevator transfer cam. Spring *10*, attached to pawl *9*, always holds the hook on the pawl in front of the arm *8*, except during operation of the machine when pad *11* will depress the pawl so that the second-elevator cam lever will be free to descend to transfer position in order to receive the matrices which are to be lifted up to the distributor. After a distributor stop has been cleared away, pawl *9* may be depressed with the foot and the second-elevator lever lowered to the transfer channel. The machine will then be set in motion again after unlatching the spaceband transfer lever, permitting the transfer lever to push the matrix line from the first to second elevator.

Adjustment of the 30-em Transfer Slide.—When the 30-em machine is

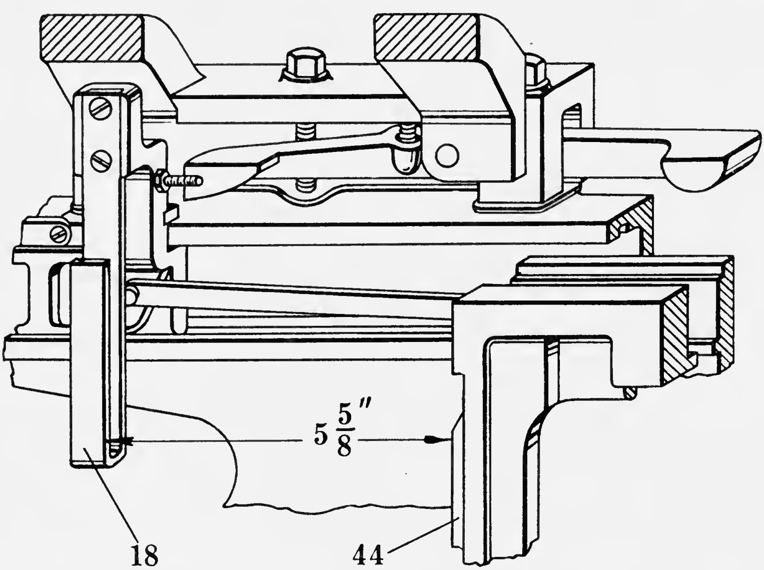


FIG. 119.—Elevator Transfer Slide Finger Adjustment. While the 30-em machine is standing at normal position, there should be 5⅝″ space between the right side of the finger *18* and the left side of the first elevator duplex rail return plate *44* at the left side of the transfer channel. This adjustment is made by moving the elevator transfer lever shaft cam roller arm *7*, Fig. 113.

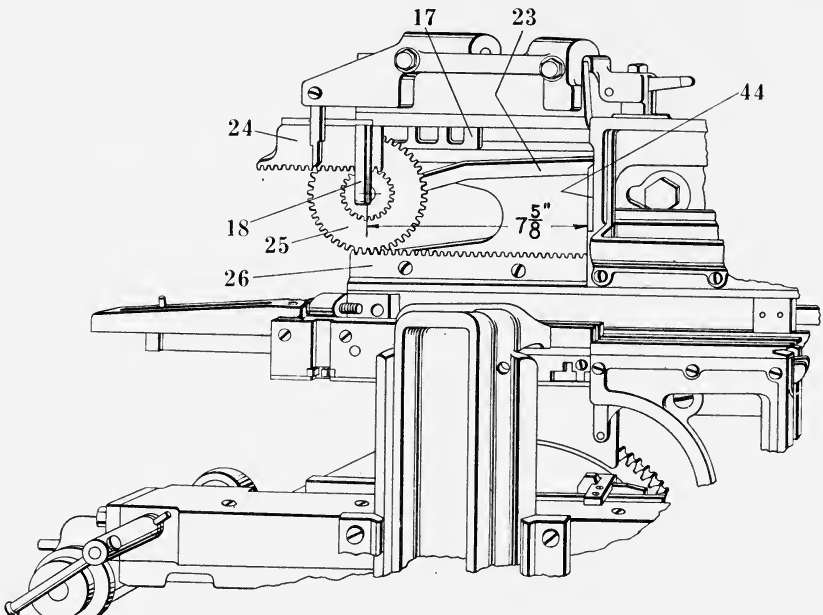


FIG. 120.—The 42-em Elevator Transfer Slide Mechanism. While the machine is standing at normal position, there should be 7⅝″ space between the elevator transfer slide finger *18* and the first elevator duplex rail return plate *44* at the left side of the transfer channel. This adjustment is obtained with the elevator transfer lever shaft cam roller arm *7*, Fig. 113.

standing at normal position, there should be 5⅝″ space between the right side of transfer finger *18*, Fig. 119, and the left side of the first elevator duplex rail return plate *44* on the transfer channel. The finger will then be in proper position to clear the separating block in the first-elevator jaw and the first matrix in a full 30-em line when the elevator is ascending to transfer position. The 5⅝″ adjustment is made by moving the cam roller arm *7*, Fig. 113, after loosening the two hexagon head screws *8*, binding the arm *7* to the shaft *10*.

The 42-Em Transfer Slide

The transfer lever and cam mechanism on the 42-em machine is the same as that used on the 30-em machine. The cam causes the transfer lever to move with a 30-em stroke, while the transfer slide moves 42 ems to shift the matrix line from the 42-em first-elevator jaws to the second-elevator bar, by two racks and a reduction gear. This gear *25*, Fig. 120, is in the ratio of 6 to 1 and is spoken of as a reduction gear because the slide would travel too fast for the movement of the lever if the smaller gear were not interposed between the parts.

The slide *17* travels in a groove in the face plate just like the 30-em slide; the finger *18* attached to the transfer slide *17* is caused to transfer matrices to the second-elevator bar when the link *23*, fastened to the transfer lever moves the gear *25*, upon the rack *26*. As the transfer lever through link *23* moves gear *25*, a rack *24* on the transfer slide *17* meshing with the smaller gear is also caused to move.

If for any reason the transfer finger slide *17* is removed from the machine, the gear and racks must be properly timed when reassembling. There are small punch marks in the teeth for this purpose so that the parts will be in time upon returning them to the machine.

Adjustment of the 42-em Transfer Slide.—The distance from the right side of the finger *18* to the left side of the first-elevator duplex rail return plate *44*, Fig. 120, on the transfer channel is 7⅝″. This is secured when the machine is standing at normal position by adjusting the elevator transfer cam roller arm 7, Fig. 113, at the rear of the machine column.

Transfer Lever First Stroke

When the elevator transfer and spaceband transfer levers come together the first time as the transfer slide finger *18*, Fig. 121, has finished sliding the matrix line to the second elevator bar, the right side of the finger *18* should come flush with the left edge of the second-elevator bar plate *51*. In this first stroke of the transfer levers, the spaceband transfer lever and pawl *45* merely idle, being compelled to do so by the turnbuckle attachment to the transfer lever inside the machine column. Adjustment of the first stroke of the transfer lever so the finger *18* will be flush with the left end of the second-elevator bar plate *51* is made by a screw in the automatic safety pawl in cam No. 10 (delivery and elevator transfer cam). The transfer lever cam is inside the periphery of the delivery cam. So the roller on the transfer lever cam roller arm can operate the automatic safety pawl, a plunger is mounted in the cam. The plunger in the cam bears against the adjusting screw in the safety pawl and the first stroke of the transfer finger is regulated by this screw which forces the safety pawl against the cam rim so it will clear the upper stopping lever, permitting the machine to complete its revolution. As is explained elsewhere, if the second or first elevators do not make complete transfer strokes, the transfer lever cam roller arm is held up and the automatic safety pawl engages the upper stopping lever and stops the machine.

Transfer Lever Second Stroke Adjustment

When the transfer slide *17*, Fig. 122, and spaceband transfer lever *46* come together a second time, after having transferred the matrix line to the second-elevator bar, the transfer finger *18* pushes the spacebands under the hooked end of the spaceband transfer lever pawl *45*. When the finger and the pawl are together, there should be ⅛″ space between the right side of the finger *18* and the bottom of the slot in the pawl *45*. This adjustment is made

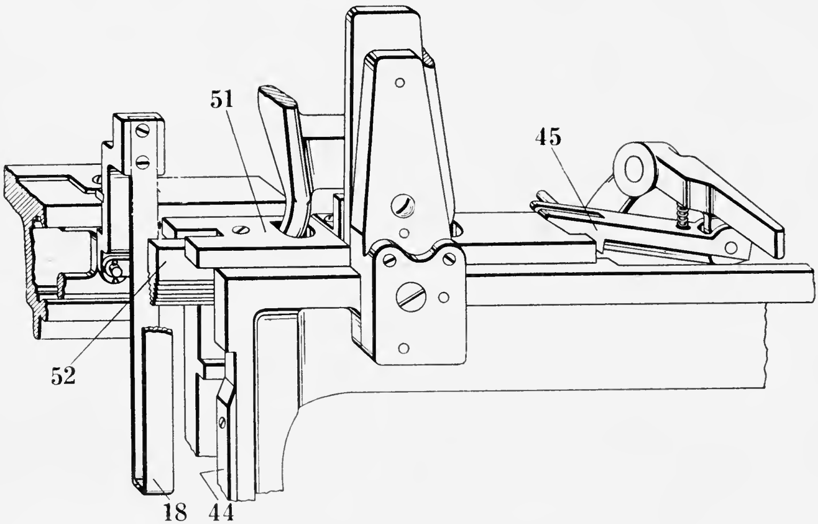


FIG. 121.—The First Stroke of the Transfer Slide Finger, *18,* is regulated by a screw in the automatic safety pawl in the rim of the elevator transfer cam, Fig. 164. This screw should be set so that when the elevator transfer lever cam roller causes the plunger in the cam to move the automatic safety pawl clear of the upper stopping lever, the right side of the finger *18* will be flush with the left end of the second elevator bar plate *51.* When this adjustment has been properly made, the finger *18* will push all the matrices onto the second elevator bar *52,* clear of the first elevator jaws.

with the screw *20* in the slide *17*. The buffer plate *48* has small felt disks behind it which form a cushion for the impact of the transfer slide and spaceband transfer lever when they come together.

Spaceband Transfer Lever Turnbuckle

While the machine is resting at normal position, the hook on the spaceband transfer lever pawl should come ⅛″ past the inclined corner of the spaceband box top rails. This pawl conveying the spacebands clear of the horizontal tops of the rails, will start them down the incline, from which point the spacebands slide by gravity into the box. This adjustment is made with the turnbuckle *15*, Fig. 113.

Setting the Second Elevator Transfer

Setting the second-elevator transfer means that the first elevator must be aligned for height so that the matrix teeth will register with the second-elevator bar, and the bar must be adjusted horizontally so that there will be no sidewise friction of the matrix teeth with the bar teeth.

The adjustments for this transfer have been made easily accessible so that by the exercise of a little patience anyone can adjust the parts. These adjustments are highly important for the reason that if matrix teeth are out of register with the second-elevator toothed bar while being transferred, they will be worn down and distributor troubles will result.

To begin with, there is little use to attempt the setting of a second-elevator transfer if the first-elevator back jaw is kinked or deflected away from the front jaw, which condition will permit matrix teeth to slur the end of the second-elevator toothed bar. Using a *new pi matrix,* see that the first-elevator back jaw is properly spaced with the front jaw at the right-hand end so that the matrix will pass in and out of the jaw freely with slight play. After having seen that the back jaw is in proper order, look at the second-elevator bar. If there are burrs at the receiving end of the bar teeth, carefully dress them out with a fine three-square needle file, being particular to preserve the angular pitch of the teeth.

Remove the front and back first-elevator jaw detents so they will not throw the new pi matrix out of alignment while testing adjustments.

"Seeing" the Transfer.—With the machine in transfer position and a *new pi matrix* in the first elevator, place a lamp on top the transfer channel opposite the second-elevator bar plate and to the left of the spaceband transfer lever, so as to illuminate the interior of the transfer channel. Push the new pi matrix close to the second-elevator bar, but not engaging it. Look through the first-elevator jaws from the left end, and the position of the new pi matrix in relation to the end of the second-elevator bar can be noted. The lamp placed on top the transfer channel will enable you to see the light between the matrix and bar teeth.

Adjustment of the Transfer.—If the matrix teeth are too high or too low to match the bar teeth, raise or lower the first elevator by means of the adjustable stop screw in the stop bar at the lower end of the slide. To adjust horizontally, loosen fastening screw *58*, Fig. 123, in the lower guide and turn screws *59* and *59*. Moving these screws positions the lower guide plate *57*, against which the second-elevator bar plate angle piece *54* rests.

Adjustment of the Bar Pawl.—After setting the vertical and horizontal positions of the matrix, set the transfer bar pawl *8*, Fig. 112, in the bar *7*, so that when pushed up with a finger, its lower edge will be even with the lower tooth of the second-elevator bar. This bar *7* can be adjusted to position pawl *8*, by loosening the fastening screw *13* and *14*, Fig. 123, and adjusting the screws *10* and *11* until the pawl *8*, Fig. 112, is even with the lower tooth of the second-elevator bar. Press up on the transfer bar to force it against the adjusting screws *10* and *11*, Fig. 123, while tightening screws *13* and *14*. The pawl should have a little vertical play. After some time its lower edge will have become worn and should be replaced for the reason that if worn and the bar is adjusted to bring the pawl even with the lower tooth of the second-

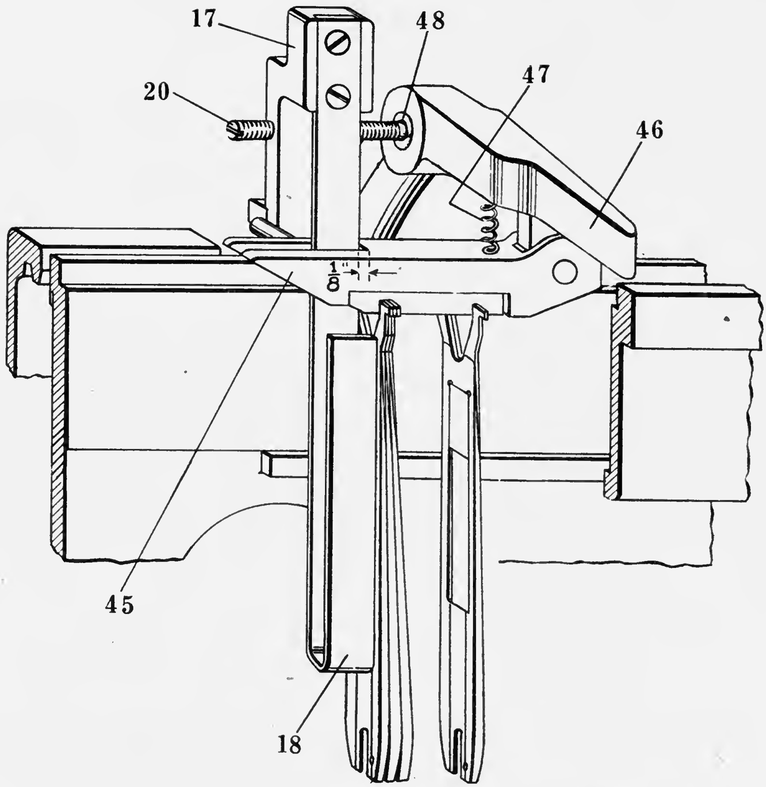


FIG. 122.—Second or Spaceband Transfer Stroke of the Transfer Levers. After the second elevator has lifted the matrix line from the transfer channel, the transfer levers cause the transfer finger *18* to push the spacebands under the hooked spaceband transfer pawl *45*, so the pawl may return the spacebands to the spaceband box. When the transfer finger and the pawl have come together as shown in this drawing, there should be ⅛″ space between the right side of the transfer finger *18* and the bottom of the slot in the pawl *45*. This space is obtained by the adjusting screw *20* in the transfer finger slide *17*.

elevator bar, the bar itself will have to be positioned so low that its beveled edge will be rubbed by the matrix teeth.

The three screws *12*, Fig. 123, hold the transfer cap in position on the face plate. The cap is doweled and therefore is not adjustable.

At *39* is shown the rear matrix stop block, which, working in conjunction with a similar block on the front plate prevents matrices sliding off the end of the second-elevator bar.

Screw *60* fastens the duplex rail operating bar to the transfer cap.

It is quite possible that an occasional jam of some kind at the distributor, caused by opening the controlling lever too quickly, may spring one of the

legs of the bar plate link *50*, or the hinge pin may be sprung, so that when adjusting screws *59* are turned, the bar plate *51* cannot be properly positioned for adjustment. The hinge pin or legs can be straightened again. It is best to straighten the link legs in a vise rather than pound them with a hammer.

The adjusting spring *53* holds the bar plate angle piece *54* against the lower guide plate *57* while the second elevator is in transfer position. This spring 53 also holds the link *50* steadily against the stop pin *56* while the elevator is rising or descending, especially in the case of a wide matrix line.

The bar plate spring *61*, hooked into the link *50* and at the other end into a screw hook, balances the bar plate *51* so the matrices will not rock while being lifted up to the distributor.

A second-elevator bar, like the distributor box bar, lasts indefinitely over a period of years, providing the transfer mechanism is kept in proper order at regular intervals and an accident of some kind has not ruined the teeth at either end.

The Distributor Shifter

As soon as the second elevator has lifted the matrix line to its seat at the distributor, the shifter which has been caused to move in an outwardly direction from the distributor box, pushes the matrices past the font distinguisher into the distributor box.

In Fig. 124 is shown the shifter employed on the Mixer Intertype. The one commonly used on the other machines is similar to it with certain modifications and is actuated in like manner.

The shifter consists of a hub *6* pivoted on a shaft attached to bearings on the mold gear arm *12*, having a lever *5* extending upwards to a link 3 connected to the shifter slide *1*. The slide *1* carries a flexibly mounted buffer *2* corresponding in a general way to the shape of a matrix.

The buffer *2* is caused to feed matrices into the distributor and also follow the movements of cam *11* through pressure of spring *9*, which is attached to a lug on hub *6*, and fastened at the lower end to a screw (not shown) inside the cam shaft bracket *13*. Cam *11*, actuating the outward stroke of the shifter, is attached to the mold turning and vise closing cam *10*.

Function of the Cam Rider.—A cam rider 7, held in position by the cam rider spring *8*, works directly upon the shifter cam *11*. In case of an interference to the shifter slide or cam rider, the spring *8* furnishes a cushion which prevents breakage of the parts. The spring has sufficient tension to carry the shifter slide through its normal movements.

When the machine is standing at normal position, the cam rider 7 should not touch cam *11*. If it does, the face of the buffer *2* will be held away from the vertical faces of the distributor box rails and the last one or two thin matrices will remain in the box undistributed. This is often caused by a slight rebound of the main cams when the machine comes to normal position. In order to have a little clearance between the cam rider 7 and cam *11* when the

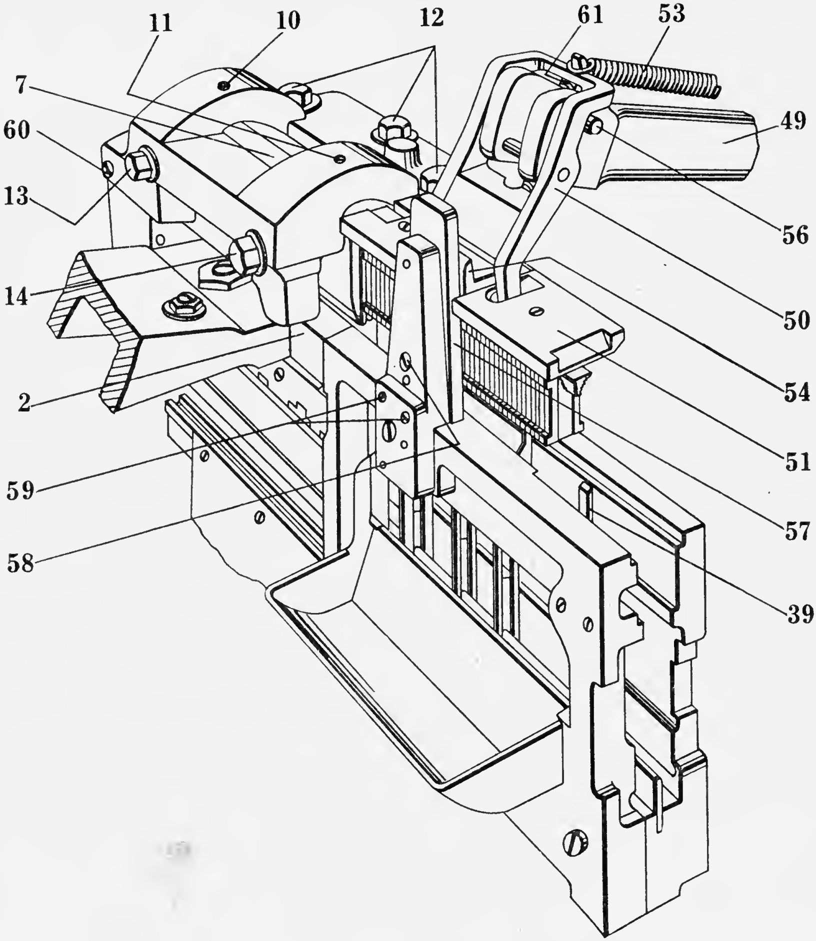


FIG. 123.—Perspective View of the Transfer Channel and Second Elevator. The second elevator is lifting the matrix line from the transfer channel. The spacebands remain in the channel and will be shifted to the spaceband box by the spaceband transfer lever pawl after the transfer levers make their second stroke and return to normal position.

machine is at normal position, place a narrow strip of 2-point brass rule between the rider *7* and the screw *14*, by backing up the machine until the shifter rider is held out by the cam, then press in on the shifter lever and curve the strip of brass rule around screw *14*.

Lubrication of the Shifter Slide.—The shifter slide *1* travels in a track in the slide guide *16*. *The track should be lubricated with dry graphite only,* as should also the delivery slide and transfer slide tracks. The spring *4* attached

to link *3* counterbalances the weight of shifter slide *1* on the Mixer machine. The weight of the slide makes this necessary. The shifter slide used on all other machines does not have this counterbalance spring.

When the slide *1* is standing at normal position, it rests against a stop screw (not shown) in the slide guide *16*. If this screw becomes broken, the buffer *2* will project over and interfere with the upstroke of the distributor box matrix lift.

If it is necessary at any time to remove the shifter lever spring *9*, pass a cord through the upper spring loop and disengage its upper loop from the spring lug. Upon replacing the spring, engage its lower loop with the screw in the cam shaft bracket, then pull up on the cord and pass the upper loop over the spring lug on the hub.

Function of the Shifter Buffer.—If the buffer *2* is not in position over the lift *15* (shown in the detail drawing) so that it will feed the last thin matrix in a line into the distributor, look to see if the buffer spring *17* is pushing the buffer its full distance so that the screw head *18* will be against the slide arm *1*. If the buffer face offset *19* is too near the lift *15*, a thin washer may be put on the buffer stud between the screw head *18* and the slide arm *1*. The washers should be free to move after applying them to the stud.

The buffer *2* feeds the last few matrices into the distributor, through pressure of spring *17*. The slide *1* stops against a screw in the slide guide, but its arm does not extend far enough into the distributor box so that the buffer face *2* will strike the vertical faces of the distributor box rails. This arrangement is provided so there will be no possibility of the buffer injuring the vertical faces of the distributor box rails.

Second Elevator to Distributor Box Bar Transfer

Nothing must interfere with the smooth transfer of matrices from the second elevator to the distributor box bars at the point where the two bars join. Any interference here caused by the bars being out of line, or an open space between the joint will ruin the matrix teeth.

Sometimes these two bars do not line up properly (front and back), and it may then be necessary to relocate the position of the shifter slide guide casting in relation to the distributor beam by packing with one or two pieces of paper.

The distributor box bar is suspended on two pins so that its outer end has a slight vertical play and vertical alignment with the second-elevator bar takes place as the second elevator seats. The elevator bar engages an extension on the outer end of the distributor box bar which rests upon the second-elevator bar plate and is supported by it.

Occasionally, the second-elevator lever may rest in such a position that there will be too much open space between the bar joints. The lever may become sprung by accidental dropping of the second elevator, which, when dropped falls heavily upon the transfer channel, due to the lever weight.

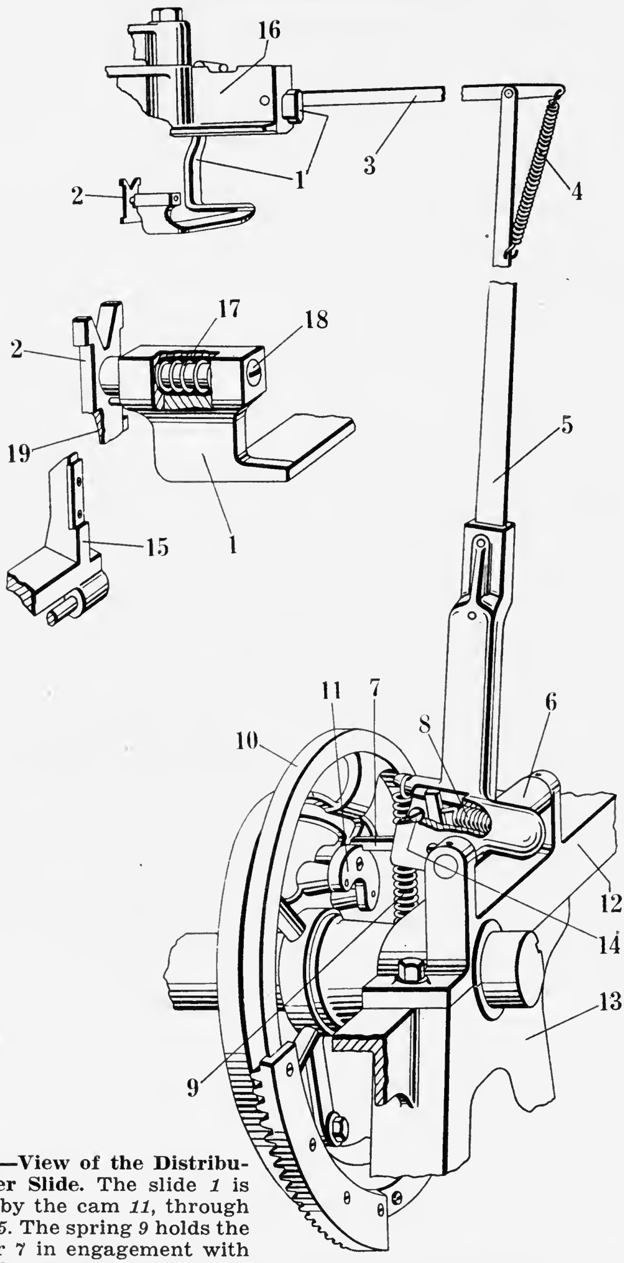


FIG. 124.—View of the Distributor Shifter Slide. The slide *1* is actuated by the cam *11*, through the lever *5*. The spring *9* holds the cam rider *7* in engagement with the distributor shifter cam *11* while the cam passes under it. The shifter mechanism pushes the matrix line from the second-elevator bar into the distributor box.

If the second-elevator lever fork strikes the side of the upper guide nearest the distributor box and there is an open space between the two bars it may be necessary to pien the second-elevator lever slightly so that the bar will bear towards the distributor box bar instead of away from it. In piening the lever, use a light hammer and have someone steady the lever in the direction it should go while tapping the length of the lever up to the point where the screw for the adjusting spring is located, but not above it.

It is well to maintain the font distinguisher as well as the distributor box rails in good order to assist in smooth transfer of the matrices from one bar to the other.

Chapter XXV

THE FONT DISTINGUISHER

The font distinguisher used on equipments A, B, C, D and X consists of an adjustable finger mounted at the entrance of the distributor box. The setting of the finger is controlled by a rod and a notched index plate. Wrong font matrices are automatically prevented from entering the box and distributing into the magazine. A shallow slot or font notch is cut in the bottom of each matrix and these notches correspond to the setting of the font distinguisher finger.

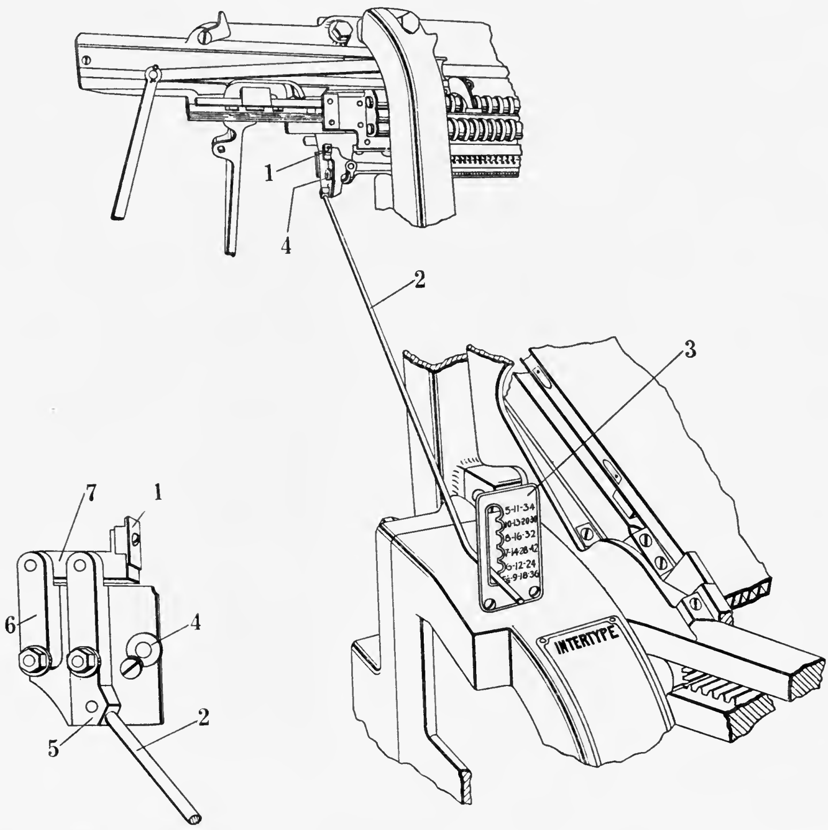


FIG. 125.—View of the Font Distinguisher employed on single distributor Intertypes. Wrong fonts are easily accessible for removal. The distinguisher setting is governed by the position of the rod *2* which engages one of the notches in the index plate *3*.

There are six positions to which the finger *1*, Fig. 125, may be set by means of the rod *2* so as to engage one of the indexed notches in the indicator plate *3* mounted upon the machine column.

The entire distinguisher may be removed from the machine by loosening screw *4* and turning a notched locking disk.

As the lever *2* is manipulated from one notch to another in the indicator plate *3*, the finger *1* is caused to move horizontally to any one of its six positions. This is accomplished when rod *2* (in the small detail drawing) causes the lever *5* to move the finger block *7*. The lever *5* moves within a small arc but the method of mounting the connecting finger block *7* with the link *6* causes the finger *1* to move in a horizontal line.

The finger *1* in time will become rounded, or through an accident may be broken, when it can be reversed to present a new point to the matrix slots.

The distributor box front and back plates should not be sprung apart through careless handling. If the distance between the box plates is widened, the front and back upper rails cannot properly guide the matrices over the font distinguisher finger.

The font distinguisher for the Mixer machine is explained in that section dealing with the Mixer distributor box.

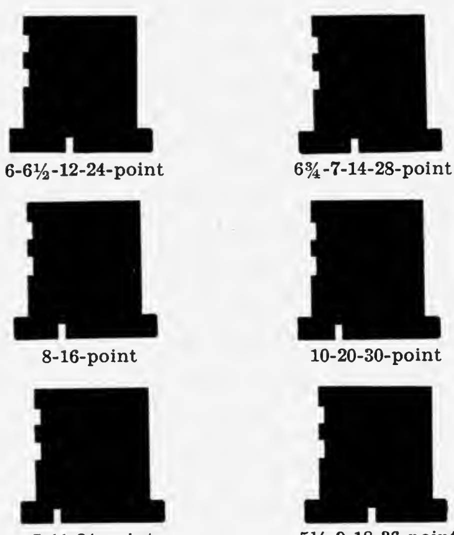


FIG. 126.—How to Determine Face Sizes. To determine the face size of a matrix, lay it over the silhouettes successively, casting side to left, until the one is found in which the font slot coincides with the slot in the matrix. The caption beneath the silhouette will indicate the face size of the matrix. While the position of the font slot is the same for three or more sizes, the sizes are so far apart that the right one can be readily determined by the size of the matrix character.

Chapter XXVI

THE DISTRIBUTOR

During the transfer of the matrix line from the first elevator to the second elevator, the teeth of the matrices are caused to engage a toothed bar on the second elevator which then lifts them up to the distributor. As the second elevator comes to its seat at the distributor, a shifter is caused to move outwardly which then pushes or transfers the matrices over the font distinguisher into the distributor box so they can be fed, one at a time, into the distributor.

The distributor consists of a cast iron beam mounted at the top of the distributor bracket and extending across the top of the machine above the magazine. The beam supports the various parts of the distributor which are, principally, the toothed combination bar, three conveyor screws, a driving clutch, the distributor box and a thin blade of metal, called a screw guard, set between the two front conveyor screws. On the Mixer machine a second distributor bar and set of conveyor screws is added and a means is provided for actuating the box to pass from one distributor to the other, the mechanism for which will be explained later.

As long as the power is applied to the machine, the distributor clutch which is connected by a belt to the intermediate shaft, causes the three conveyor screws to revolve continuously so that as each matrix line is transferred by the shifter mechanism from the second elevator into the distributor box, the distribution of matrices will commence automatically.

The three conveyor screws are driven by the clutch through a group of meshed gears attached to the screws at the right of the machine. The conveyor screws are mounted, two in front (one above the other) and one at the rear of the beam. Interposed between the conveyor screws is a long combination bar, the lower edge of which is beveled and toothed. These teeth correspond in size and shape to the matrix teeth. There are seven teeth or rails extending the length of the bar, which are opened or blanked out at certain intervals so as to permit matrices to drop off by gravity into a channel entrance, and from there into the magazine. Each matrix channel is positioned under the combination bar just below the point on the bar at which the blanked out teeth or grooves occur which correspond to the combination of the matrix intended to pass into it. While the matrix, hanging by its teeth, is being urged along the bar by the revolving distributor screws, it cannot drop out of engagement with the bar and screws until the point has been reached where the combination teeth of the bar have been blanked out.

The Distributor Bar for the main magazine has ninety-one tooth combinations. This system of matrix distribution (that is, automatically returning

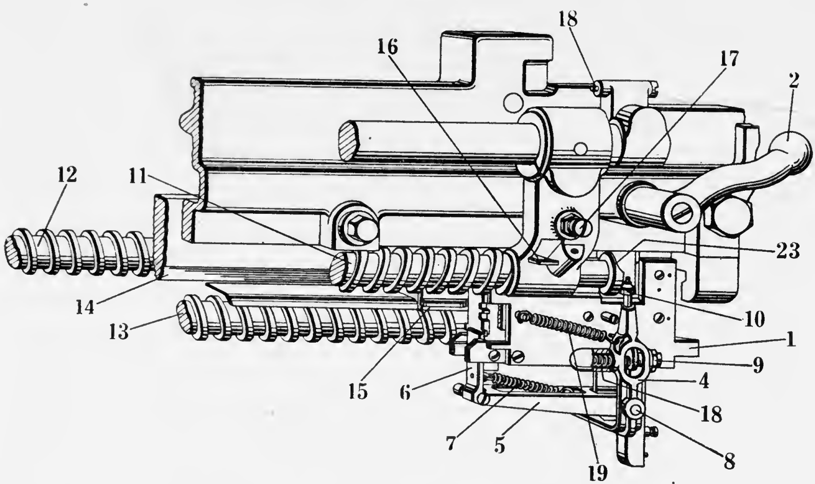


FIG. 127.—The Distributor Box used on single distributor Intertypes. In this view the lift *6* has just raised a matrix from the box rails into the distributor screws *11*, *12* and *13*. The matrix, after leaving the box rails will be supported by its teeth engaging the teeth of the combination bar *14*. The screws will urge the matrix along the bar until an open space in the teeth of the bar *14* will permit the matrix to drop from the bar, out of engagement with the screws, into the channel entrance. The matrix will pass through the channel entrance into the magazine.

the matrices to the magazine) can be understood by comparing the matrix combination teeth to a key in a lock; some of the teeth on all matrices from the magazine are blanked out and certain other teeth are left in the tooth recess.

The Conveyor Screws propel the matrices along the bar and are approximately one inch in diameter. The first Intertype screws were made with four threads to the inch; a little later, due to the addition of the side magazine unit carrying matrices with large-bodied display faces, the screw threads were widened to three and one-half pitch. The present two-pitch screw conveys matrices at a rapid rate across the distributor bar and speeds distribution to the magazine. At the same time, large-bodied matrices are fed successively from the box into the screws so that there is ample space between each matrix and they will not interfere with each other while in engagement with the screws or upon dropping into the channel entrance.

The Distributor Box

The distributor box receives the matrices from the second elevator so that they may be separated singly and lifted into the conveyor screws by the box mechanism for distribution to their respective channels in the magazine. The box consists of a bracket, two side plates, a toothed steel bar and a bar

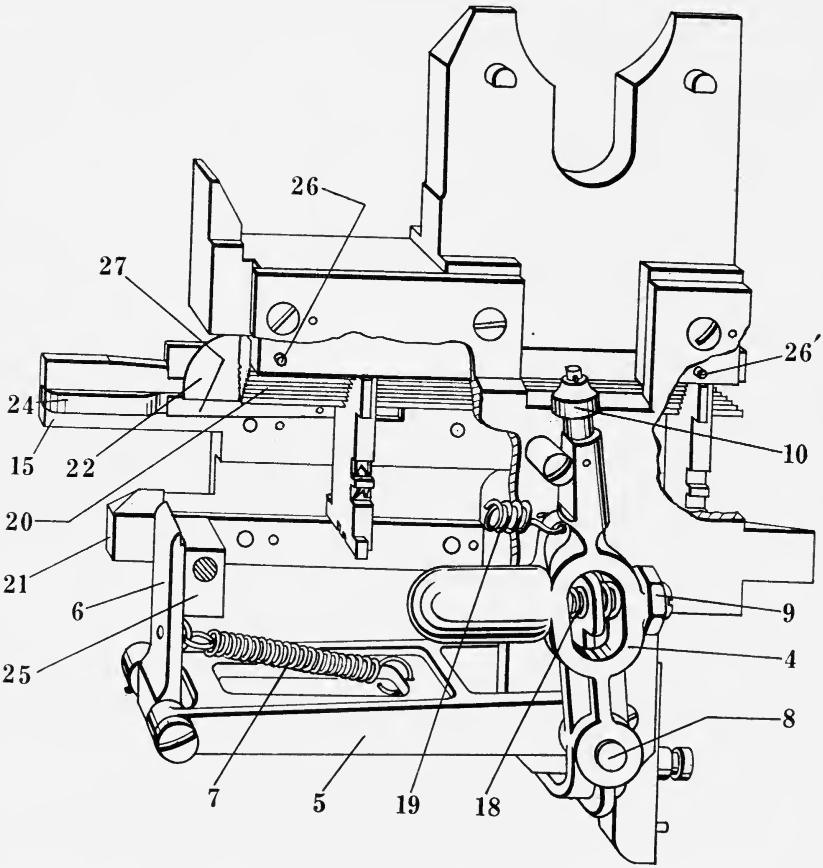


FIG. 128.—Interior View of the Single Distributor Box. The back plate has been broken away to show the box bar *20*. Matrices are pushed into the box by the distributor shifter. The matrix teeth engage the teeth of the bar *20*. The matrices come to rest against the vertical faces of the box rails, two of which are shown at *15* and *21*. The lift *6* mounted upon the lever *5*, will raise the matrices, one at a time into the distributor screws. The lift *6* is compelled to make its successive up-and-down strokes by the connection of the lever *5* pivoted at *8*, which bears against the lift cam *23*, Fig. 127. The bar point *22* permits but one matrix to be raised at a time.

point, four rails and a lift and lift lever, together with smaller parts, and is mounted on the beam at the left end of the conveyor screws.

The box *1*, Fig. 127, is held in place by a slotted bracket which slips under the bolt *2* screwed into the distributor beam. As the matrices are received into the box from the second-elevator bar, they slide along the toothed distributor box bar *20*, Fig. 128, which matches the second-elevator bar at the left-hand side. The box bar *20* fits into a slot in the bracket and is fastened

with two dowel pins *26* and *26'*. The end of the box bar where it joins the second-elevator bar is free to move up and down slightly and as the second elevator comes to its seat at the distributor, its bar fits under a projection on the box bar which causes the bars to be held in vertical alignment. As the matrices are pushed into the box by the shifter, they finally leave the box bar *20* just before reaching the vertical faces or shoulders of the distributor box rails, which then support them by the two upper lugs or ears.

The back plate of the box *1* in Fig. 128 is broken away to show the interior. The upper rails, one of which is shown at *15* and the lower rails, one

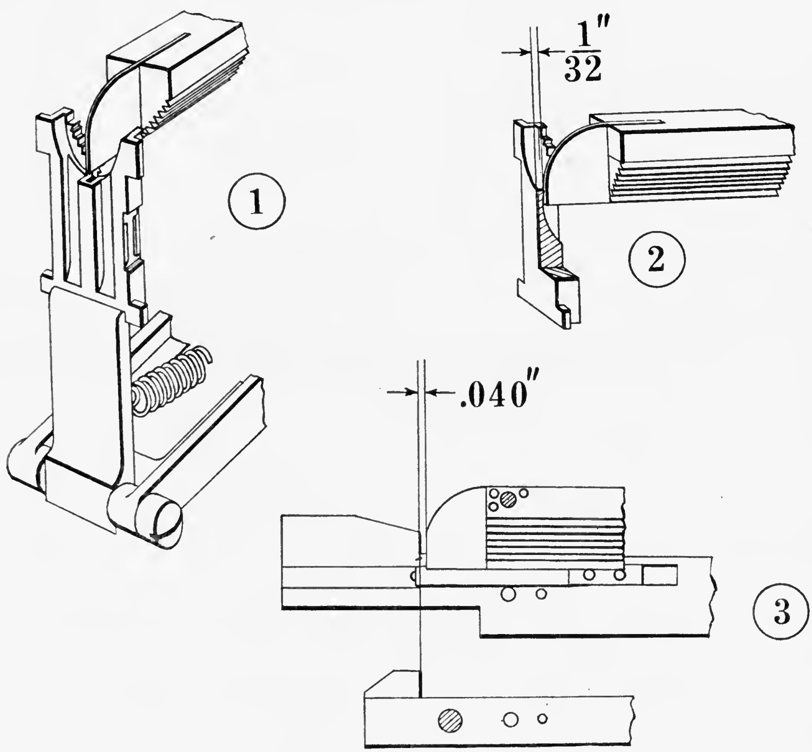


FIG. 129.—The Distributor Box Bar Point is set in the end of the distributor box bar and held in place by two pins. The function of the bar is to hold down the second matrix which might be raised through friction as the first one is being lifted into the conveyor screws.

At *1* is shown a perspective view of a matrix about to be raised into the distributor screws. The bar point is in position over the slot in the matrix body.

At *2* the matrix has been cut away to show the thickness of the matrix body in the bottom of the bar point slot, which is 1/32". All matrices are of a common thickness at this point.

At *3* the diagram indicates .040" space between the vertical faces or shoulders of the distributor box rails and the end of the distributor box bar point, when the rails and bar point are new and unworn.

of which is shown at *21*, have vertical faces or shoulders opposite the end of the box bar *20* and the matrices bank against these shoulders just under the bar point *22*, due to the pressure exerted by the shifter through its spring. The bar point *22* projects from the end of the box bar and is about .022″ thick. It is set into a slot in the end of the bar and secured by two pins. This point prevents more than one matrix being lifted at a time into the distributor screws.

Operation of the Distributor Box Lift Lever. Mounted upon a hub on the back plate of the box is a lever composed of two main parts—the cam lever *4*, Fig. 127, and the lift lever *5*. This lever is pivoted on a shaft at *8*. At the top of the vertical portion of the L-shaped lever is fastened a stud and a roller *10* which bears against a small cam *23* through tension exerted by the lever spring *19*. The cam *23* is pinned to the rear distributor screw *11* and causes the lift *6* at the end of the lift lever *5* to rise and fall in unison with the revolving distributor screws *11*, *12* and *13*. In other words, as the matrix is raised into the conveyor screws, it will enter between the screw threads and at its extreme upstroke, the lift, by reason of the shape of the cam *23* will momentarily hold the matrix 1/32″ above the vertical faces of the distributor box rails until the threads of the conveyor screws have closed in and advance the matrix upon the upper part of the two upper rails, when, through the action of the cam *23*, it will descend in order to raise the next matrix in the box.

The Distributor Box Bar Point, *22*, Fig. 128, is set in the right-hand end of the distributor box bar *20*. The purpose of this point is to permit the vertical passage of but one matrix at a time. The matrix immediately following the one being lifted into the distributor screws is prevented from raising through friction by the bar point.

As previously explained, all matrices excepting the thinnest ones, have a slot milled in the top central part of the body (left side) so that all matrices, regardless of their set-width, are of a common thickness in the bottom of the slot.

In Fig. 129, detail drawings, are shown several views pertaining to the bar point. At *1* the bar point projects into the bar point slot of a matrix as the lift is about ready to raise the matrix.

The detail drawing *3* illustrates the correct distance from the vertical faces or shoulders of the upper distributor box rails to the edge of the bar point which is .040″. This figure is given in the case of new rails and a new bar point; the distance may be tested by removing the distributor box from the machine and placing two matrices, preferably new ones, in the box. Hold them against the vertical faces or shoulders of the upper rails, then look down from the top of the box at the matrices and bar point. The bar point must always be long enough to cover the second matrix.

Adjustment of the Distributor Box Lift, *6*, Fig. 127, is made by means of the screw and jam nut *9* so that when the lift has reached its highest point,

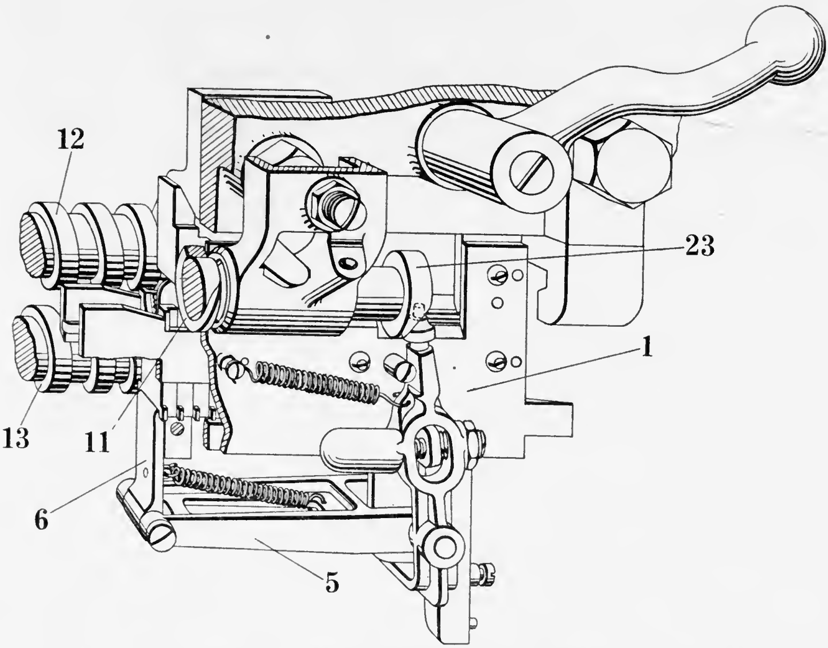


FIG. 130.—Distributor Box Lift 6 at Downstroke Position. The lip of the lift is slightly lower than the bottom edge of the matrix about to be raised into the distributor screws *11*, *12* and *13* through the action of the lever *5*, operated by the cam *23* fastened to the rear distributor screw. As the lift starts to raise the matrix, the screw threads at the left of the matrix (standing back of the distributor) are advanced about 1/32″ ahead of the left side of the matrix so that as it is lifted up into the screws, the threads will not interfere with the matrix lugs.

there will be 1/32″ space between the top edge of the upper rails and the underside of the upper matrix ears. This clearance between the matrix and rails prevents the distributor screw threads bending the matrix lugs or ears by impinging them against the rails.

When the lift has been properly adjusted for upstroke, there will likewise be more than sufficient length in the downstroke to enable the lifting shoulder of the lift to position itself under the next matrix about to be raised. The low part of the lift lever cam *23* is cut out in order to accomplish this.

Distributor Box Block Adjustment.—The lift *6*, Fig. 128, is adjustable for "bite" upon the matrix by tilting the block *25*. That is, the block should be tilted after loosening the screw which passes through it until the seat of the lift is positioned under a matrix about .028″, or the average thickness of a regular six-point thin space. If the block is adjusted in this manner, the lift will not attempt to raise the last matrix in the box (if there should be one) while the shifter is retracted.

The Lift Lever Safety Spring.—At *18*, Fig. 127, is shown what might be called an overthrow or safety spring. This spring functions when any obstruction occurs to the upward stroke of the lift *6*, by permitting a break in the relation of the position of the lift lever *5* and the cam lever *4*. A turned matrix will cause the spring to function. Ordinarily its tension is more than sufficient to overcome the stresses incidental to the lifting of matrices into the conveyor screws.

Distributor Box Front Plate Upper Rail Spring.—In the distributor box front plate upper rail *15*, Fig. 128, opposite the bar point, a spring *27* is embedded in a slot. The purpose of this spring is to prevent the matrix nearest the vertical shoulders from twisting when there are only two or three matrices in the box and the shifter is retracted as another matrix line is being lifted to the distributor by the second elevator. Sometimes the shifter buffer face which has contact with the left-hand end matrix in each line becomes gummy, and this spring prevents the matrix twisting as the shifter is retracted. The buffer face, however, should be cleaned regularly to remove any gummy accumulation.

Distributor Box Front Plate Upper Rail Auxiliary Spring, *24*, is fastened in the same slot as the heavier spring just described. Its function is to hold heavy matrices with offset lugs in a vertical position so the teeth will align horizontally with the grooves on the distributor bar.

The Third Transfer

In Fig. 132, the matrix is supported at its two upper lugs by the distributor box upper rails *15* and *25*. The matrix teeth register with the teeth of the distributor bar. The position of the two upper rails *15* and *25* must be maintained so that matrices will be permitted to engage the bar teeth freely. The passage of matrices from the distributor box rails to the distributor combination bar is called the third transfer. The front rail may be deflected inwardly by attempting to remove the distributor box without having turned the box bolt *2*, Fig. 127, the full distance. This may cause matrix teeth to bind against the combination bar. In this case, carefully bend the front rail *15* out until a *new thick pi matrix* will fit between the two rails without much play and without binding. To make a test, throw off the distributor belt and operate the distributor by hand so the *new pi matrix* will pass back and forth from the rails to the combination bar freely and without binding.

If the two upper rails are not spaced properly, the matrix teeth will have frictional contact with the teeth of the combination bar as they are about to pass from the rails. Matrix teeth can be rapidly ruined in this transfer if the upper rails are not properly positioned in relation to the distributor bar.

Causes of Bent Matrices

There are several contributing causes for the bending of thin matrices in the distributor box, and each one can be eliminated by giving proper attention to the care and adjustment of the parts.

The most common cause is improper adjustment of the distributor box matrix lift, that is, the stroke may not be high enough to lift the matrix so there will be 1/32″ clearance between the top corners of the upper rails of the box and the underside of the matrix upper lugs or ears. The effect produced upon a thin matrix is illustrated at *15*, Fig. 133.

Should the lifting edge of the lift *6* become rounded from long use, the lift may slip out of engagement with the matrix before having raised it the proper distance. A lift can be reworked so as to present a sharp right-angle

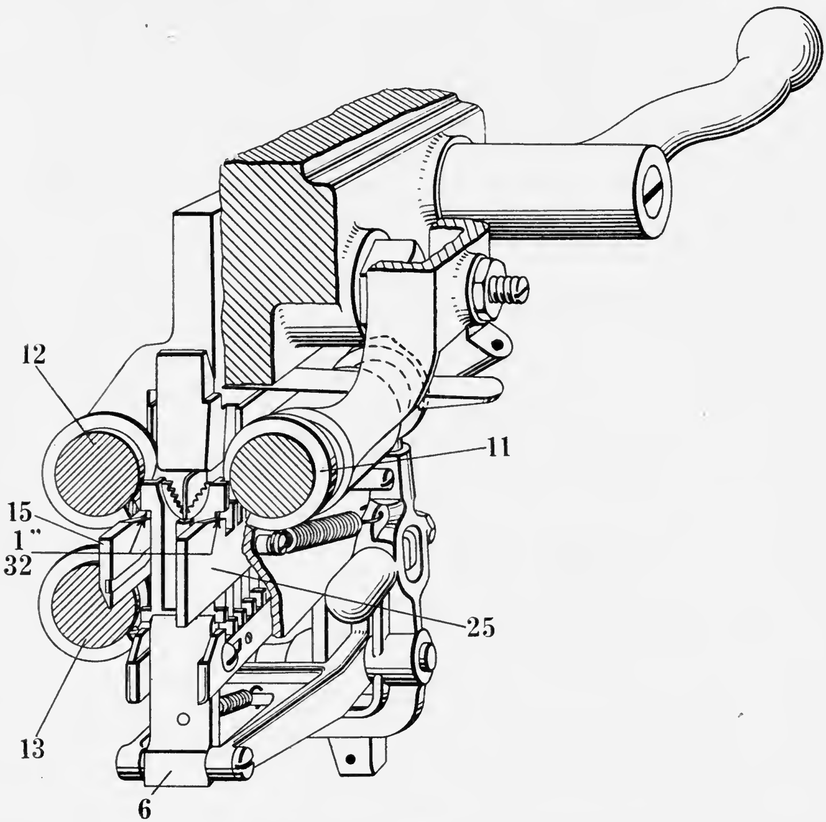


FIG. 131.—View of a Matrix at the Instant it has been Raised by the Lift, *6*, between the threads of the distributor screws *11, 12* and *13*. The lower edges of the upper lugs of the matrix are 1/32″ higher than the tops of the distributor box rails, the upper front one of which is shown at *15* and the upper back rail at *25*. As the matrix is being lifted, the distributor screw threads, at its right, are advancing nearer to the matrix, and before the lift *6* has descended, have closed in against the lugs, urging it forward upon the distributor box rails. From this point the matrix will be supported by its two upper ears on the two upper distributor box rails, until after its teeth engage the teeth of the distributor bar.

lifting surface to the bottoms of the matrices. Sometimes merely dressing on a flat oil stone will be sufficient. If badly worn, the lift should be annealed so it can be filed. After filing, harden it again by heating the top part to a bright red color, then dip the end about ¼″ deep in water for a few seconds.

Another cause for the bending of thin matrices may be improper setting of the block *25*, Fig. 128, so that the lift does not have a "bite" upon the matrix of about .028″.

The shifter buffer may accumulate a gummy substance upon its face and should be wiped off regularly with a cloth saturated with gasoline. If there are one or two matrices in the box when the shifter is retracted, one of them may become bent because the gum on the buffer face throws the matrix slightly sidewise. The same effect will result if the front plate upper rail spring, shown at *27*, Fig. 128, is broken off or is not fitted in such a manner that it does not bear against the matrices nearest the vertical faces of the upper rails as the shifter is retracted.

One of the common causes for bending thin matrices can be found in a worn or rounded bar point *22*, Fig. 128, that does not properly hold down the second thin matrix as the first one is being raised by the lift.

Through accident or wear, an occasional matrix may become rounded at the bottom so that it slips from the lift. Discard such matrices. This is not likely to occur except in the case of very old matrices.

The lift spring *7*, Fig. 127, may lose its tension so that the lift will not be held firmly against the matrices.

Neglect in oiling the lift lever stud and cam roller *10*, Fig. 127, causes excessive wear upon these parts and the roller may become elliptical in shape, so that the upstroke of the lift will vary, causing the bending of thin matrices.

The slope of the lift lever cam *23*, Fig. 127, after a long time, may become worn down so that it will give the effect of causing matrices to be lifted out of time with the distributor screw threads.

The vertical faces or shoulders of all four box rails wear. This is equivalent to throwing the distributor screw threads out of time with the lifting of matrices. The wearing off of these vertical faces also widens the original space of 1/32″ between the rails and the bar point. The bar point then appears to be too short. All four rails should be renewed at the same time.

Renewing Distributor Box Rails

Distributor box rails last a long time before showing appreciable wear. Eventually, some wear will occur on the vertical faces or shoulders which take the thrust of each matrix line as it enters the box and each matrix lifted into the distributor screws must slide upwards against these vertical faces which are approximately 3/16″ in length on single distributor Intertypes. If the shoulders are worn badly, matrices will appear to be lifted into the distributor screws too soon and the space between the vertical faces and

the bar point will be widened so that the second thin matrix will not be held down as the first one is lifted. A set of four new rails should be installed where the ones in use are badly worn.

It is intended that new rails, like other parts furnished for replacement purposes, shall be freely interchangeable, but a small amount of fitting may sometimes be necessary. This fitting is not difficult, however, if the several points noted here are observed when installing a new set of four rails. Never jam a rail upon the box plate dowel pins. If the box plate dowels do not enter the holes in the new rails with reasonable freedom, dress out the holes lightly with a small round needle file.

Before applying the rails, thoroughly clean both front and back box plates so that the rails will not be held away from the plates. This is highly important.

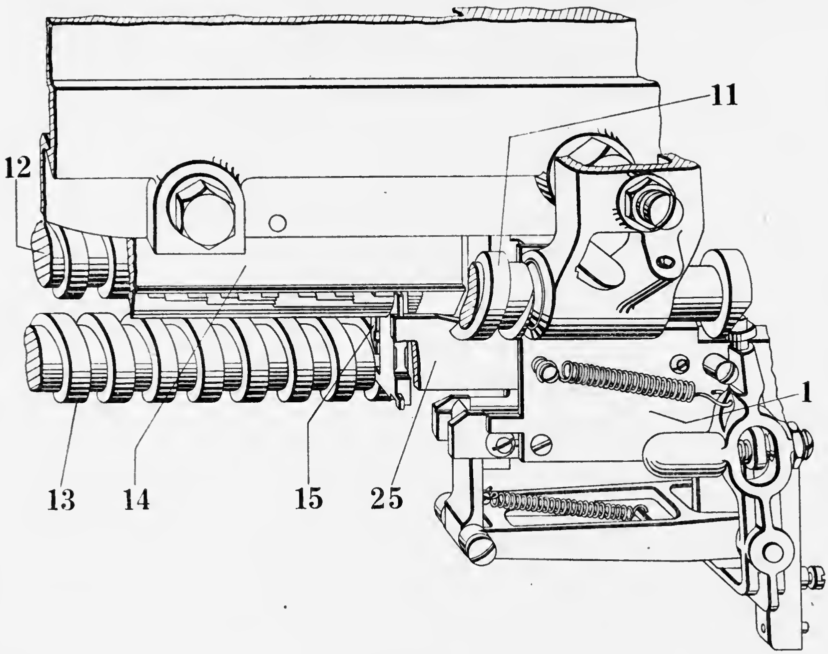


FIG. 132.—Another Step in the Distribution of a Matrix from the distributor box *1*. The matrix is about ready to pass from between the two distributor box upper rails *15* and *25* to the distributor bar *14*. The matrix teeth are now in full register with the teeth at the lower edge of the bar *14*. From this point the matrix is supported by its teeth which engage the teeth of the distributor combination bar, and is urged ahead by the three conveyor screws *11*, *12* and *13*, until, upon reaching a place on the bar where the combination teeth of the bar are blanked out, it will drop by gravity through the channel entrance and into the magazine, ready for use again.

After the four new rails have been applied, slide a new and unused matrix into the box against the vertical faces of the rails and note whether the box bar point is of proper length to permit but one matrix to be lifted at a time.

At the outside edge of the box on the ends of the two upper rails, there are small raised blocks or bosses. These are punched into the rails for the purpose of guiding matrices in proper alignment over the font distinguisher, that is, all the font notches must be aligned in a common position as the notches engage the font distinguisher while entering the box. These small blocks or bosses on the ends of the two upper rails permit only room enough for the matrix bodies to pass freely between them. A new thick matrix can be passed by hand upon the bar and between the blocks or bosses. There should only be about .005″ or .006″ clearance between the matrix and the bosses. If there is too much play here, matrices will stall while passing over the font distinguisher. It is just possible that if the proper relationship does not exist, that one or both of the box plates may not be fitted down upon the box bracket correctly. The correct functioning of the font distinguisher depends very much upon the fit of the aligning bosses in the upper rails.

The next thing to observe will be the condition of the third transfer, that is, the free passage of matrices from the two distributor box upper rails to the combination bar. Place the box in position on the distributor beam; put a new pi matrix in the box and turn the distributor ahead by hand until the new pi matrix has advanced nearly to the end of the upper rails and just before leaving them. Turn the screws back a trifle to relieve the threads from the matrix. Raise the back distributor screw. With the matrix in this position, the relationship of the matrix teeth with the teeth of the combination bar can be tested. The matrix must be free at this point.

If the matrix is not perfectly free at this point, one or both of the rails may be too high, or the space between the rails may be too narrow. Remove the box from the machine and test the space between the rails with a new thick pi matrix. There should not be more than 1/32″ freedom between the rails while the matrix is in engagement with them. Usually, the front upper rail can be gently crowded either way to correct the spacing.

If the side spacing of the rails is correct and the matrix is not perfectly free just before passing out from them to the combination bar, see whether one or both of the rails are too high by holding a small square across the tops of the rails, as shown in Fig. 134. If the rails are not of equal height, the high one can be stoned or ground off very slightly until both are equal. However, before removing any stock from the rails, make sure the box plates are not sprung and that the upper back rail fits snugly against the back plate, otherwise testing with the square will be of little value.

Applying a New Lift Lever Cam

If it is ever necessary to apply a new distributor box lift lever cam, proceed as follows:

Before driving out the taper pin holding the old cam to the back distributor screw shaft, observe the general position of the old cam, that is, the lifting curve of the cam in relation to the ends of the distributor screw threads.

Place the new cam upon the screw shaft in place of the old one and fasten it by means of a short headless 8-32 screw in the hole provided for the purpose in the sleeve of the cam. Then place a new and unused pi matrix with thick lugs in the distributor box. Turn the distributor by hand, and just at

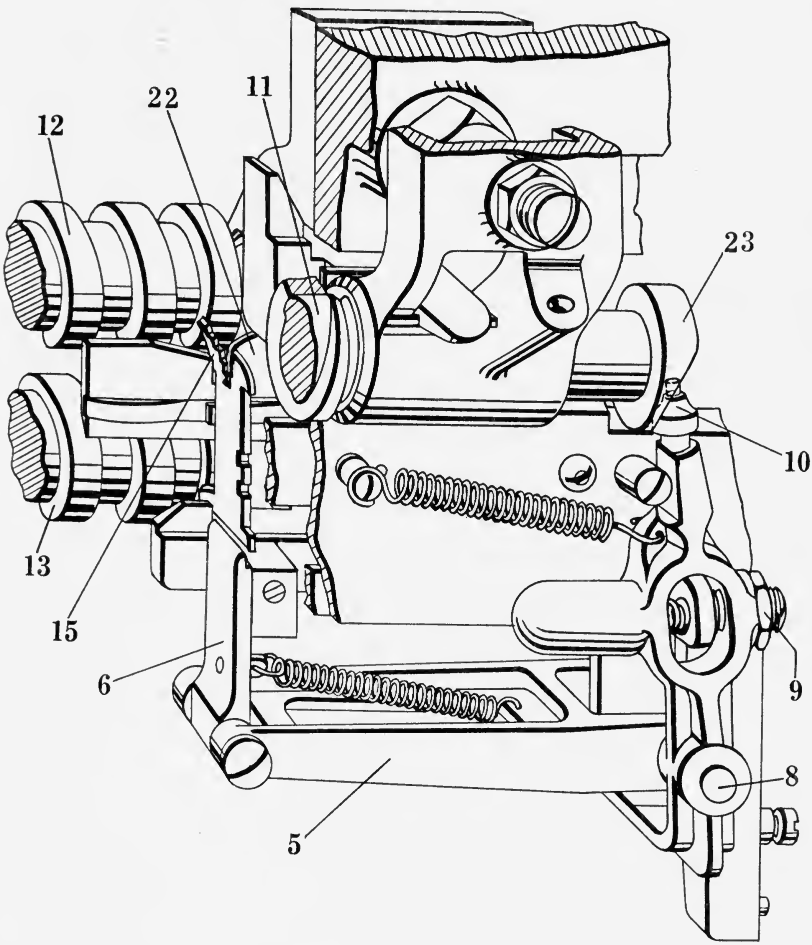


FIG. 133.—A Thin Matrix Bent by the Distributor Screws, *11*, *12* and *13*, because the lift *6* through action of the cam *23* has not raised the matrix high enough to clear the distributor box rails. This is illustrated at *15*. When the lift *6* is at its farthest upstroke, the underside of the matrix upper lugs or ears should clear the top of the distributor box rails 1/32″.

the instant the lift commences raising the matrix, note whether there is 1/32″ space between the right side of the distributor screw thread and the left side of the matrix lugs as you stand on the step looking toward the front of the machine. Move the cam until this 1/32″ space is obtained. Sometimes a new cam will work properly in the same location as the old one. However, if the matrix is lifted too soon it will strike the screw thread it is supposed to clear by 1/32″; if raised too late, the following screw thread will bind the upper lugs against the vertical faces or shoulders of the distributor box upper rails.

After having located the cam in its proper position, run several lines of matrices of all thicknesses through the distributor. Afterwards, the hole for the pin may be drilled in the cam sleeve and screw shaft with a No. 28 drill and reamed out with a No. 0 taper pin reamer. The pin can then be driven in. In case the position of the new cam is shifted from that occupied by the old one, it is best to plug the hole in the distributor screw shaft with the old taper pin and dress flush before drilling the new hole.

After applying the new taper pin, remove the temporary 8-32 headless set screw from the cam sleeve.

Mixer Distributor Box

The purpose of the distributor box on the Intertype Mixer machine is identical to that of the distributor box used on the single distributor machines made by this company. It receives the line of matrices when the second elevator has lifted it up to the distributor after the cast, so that the matrices will be raised from the box one at a time into the distributor which returns them to the magazine channels. The box contains a toothed bar *68*, Fig. 135, suspended in a slot upon the pins *72* and *72* with which the second-elevator bar registers. These two bars support the matrices by their teeth.

Matrices are lifted into the distributor screws in a manner similar to that employed in the box of the single distributor type. The matrices, however, are lifted a slightly higher distance and are carried directly from the matrix lift onto short stationary rails fastened to the distributor screw brackets independently of the box. These rails guide the matrices to align the matrix teeth with the teeth of the distributor combination bar.

The matrix line banks against the vertical faces or shoulders of the buffer rails *81* and the lower rails *67*. The upper rails *76* support the matrices after they leave the end of the toothed bar *68* and do not have a buffer stop for the matrices, as do the other rails.

The Bar Point, *69*, has the same function as the bar point in the single distributor box. It is positioned in relation to the vertical faces of the buffer rails *81* so that the point will register with the slot cut in the center of the body of all matrices except the thinnest, holding down the second matrix which might be lifted through friction with the first one.

This bar point *69* has a long shank set into a slot in the toothed box bar *68* and is supported by two pins *70* which fit into the bar and pass through

elongated holes cut in the shank. The slots permit a slight lengthwise movement of the bar point. Since all matrices are lifted a slightly higher distance than on the single distributor machines, it is necessary to provide a means for the extra thick matrices having deep bar point slots in the side of the body to pass the bar point *69*, which is caused to move to the right a trifle (looking at the box from the back) as the bottom of the bar point slot in the matrix passes it. This is equivalent to lengthening the bar point slot in the

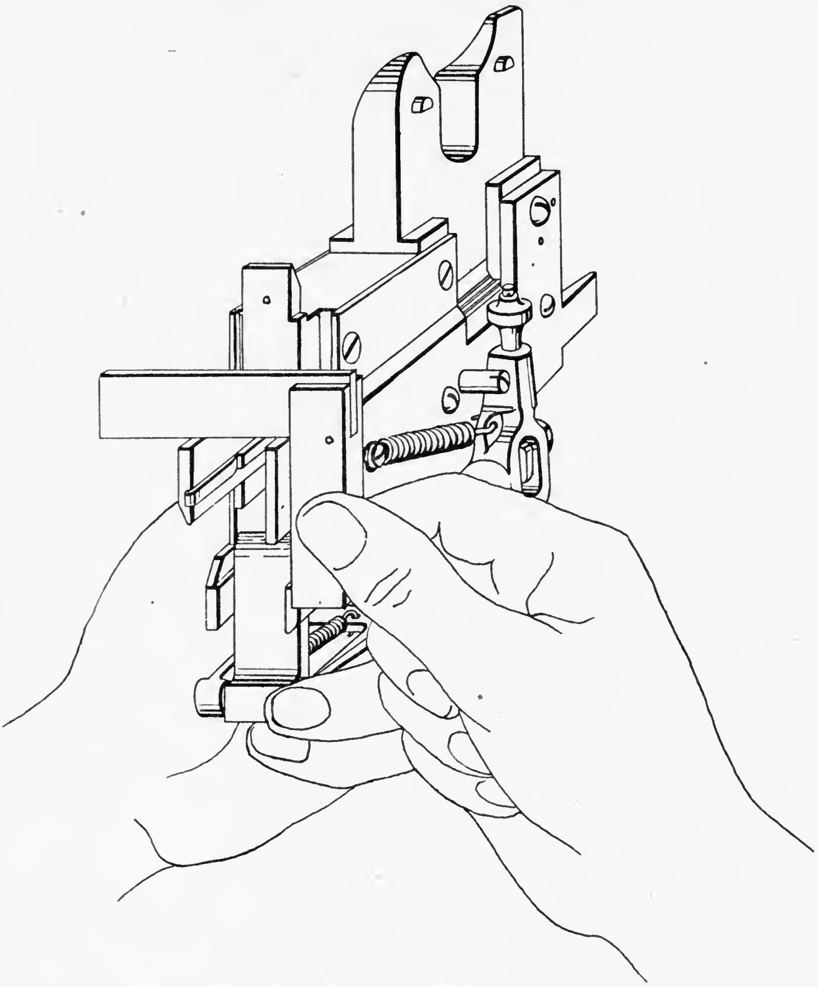


FIG. 134.—Testing New Distributor Box Rails. At the time new distributor box rails are being applied, they should be tested with a small square to see that they are of equal height. This will insure the free passage of matrices from the rails to the distributor combination bar.

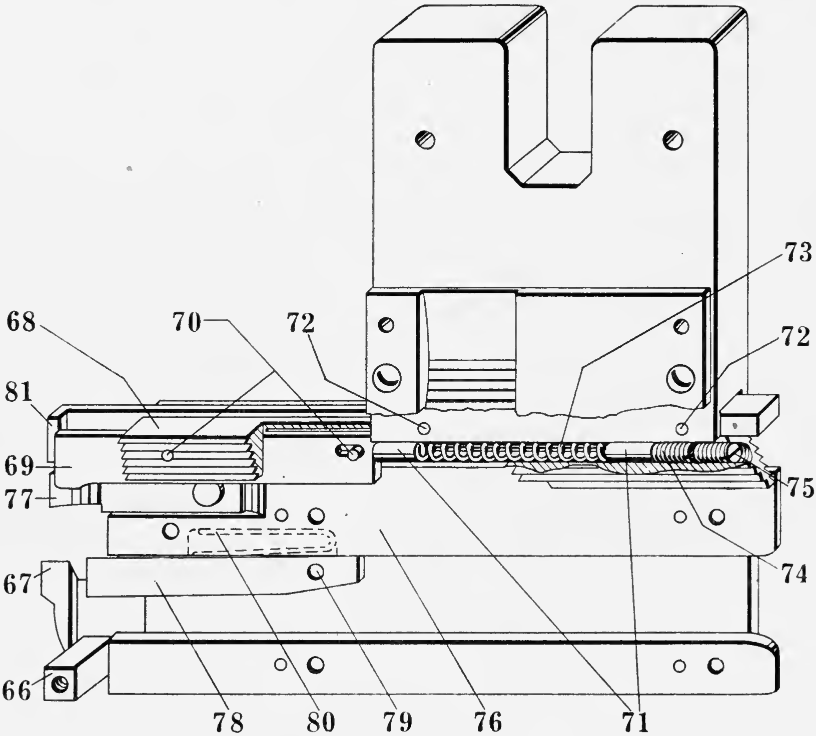


FIG. 135.—Interior View of the Mixer Distributor Box. The back plate has been broken away. Part of the box bar *68* has also been broken away to show construction of the bar point, *69* and spring *73*.

matrix body. After the matrix has passed the bar point *69*, the spring *73* bearing against the plug *71* returns the bar point to its original position. The tension of the spring *73* set between the two small plugs *71*, bearing against the shank of the bar point *69* is adjustable by means of the screw *74*. If this screw does not hold its adjustment, apply a similar one *75*, in order to lock the position of the adjusting screw *74*. The tension of the spring *73*, if too strong, will cause matrices to stall the lift as they are being raised into the conveyor screws when the bottom of the slot in the matrix body strikes the bar point. If the adjusting screw *74* is too loose, it might work out from the end of the box bar and injure the second-elevator bar.

Upper Front Rail Spring.—At *77* in the upper rail *76* there is a flat spring, the extreme outer end of which should grip the first matrix bearing against the vertical faces or shoulders of the rails *81* and *67*. When there are one or two undistributed matrices remaining and the shifter is retracted to push another line into the box, the spring *77* prevents the first matrix from tilting

out of vertical position, due to any gummy substance on the shifter buffer face as the shifter is withdrawn from the box.

The Lower Rail Block, *66*, Fig. 135, is slightly adjustable for position to regulate the amount the lifting lip of the lifts *31* and *32*, Fig. 136, shall "bite" or engage the matrices in order to raise them into the distributor screws. This "bite" should be about .028" or the thickness of an average six-point thin space. When the block has become worn on one face by the action of the lifts, it can be turned over to present a new lift bearing.

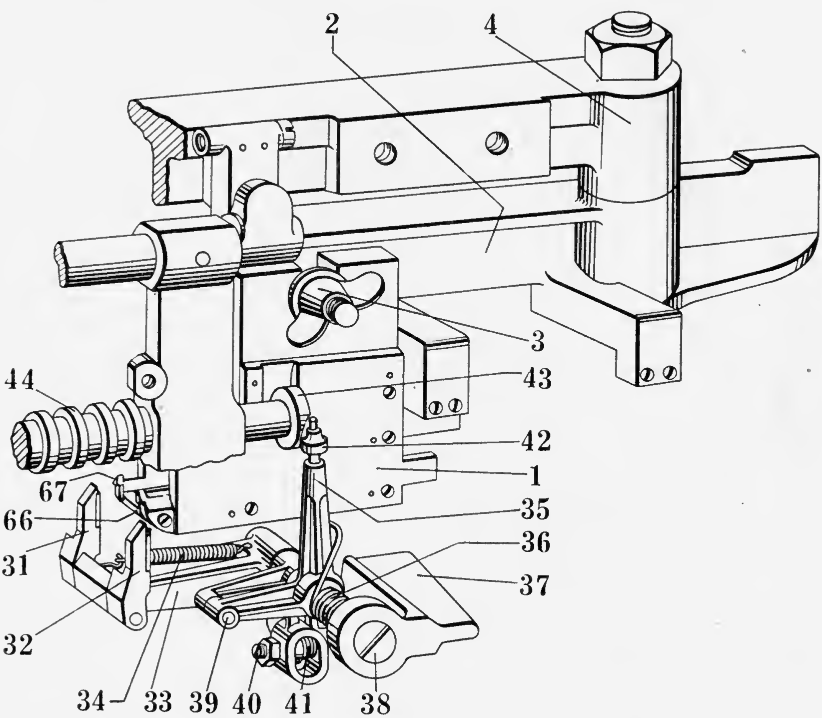


FIG. 136.—Perspective View of the Mixer Distributor Box. The wing nut and washer *3* fasten the box *1* to the swinging arm *2*. The swinging arm *2* is pivoted at its outer end upon a stud in the beam *4*. The two lifts—*31*, which lifts upper magazine matrices into the front distributor, and *32* which raises lower magazine matrices into the back distributor—are pivoted upon a pin in the lift lever *33*, connected with the cam lever *35*, mounted independently of the distributor box in a bracket *37*.

As the box *1* swings from one distributor to the other, the lifts *31* and *32* are held out and away from the lower distributor box rails *66* and *67* by the rear feeler arm pad *63*, Fig. 138, engaging the lower distributor lift *32*, Fig. 136. While being held out by the feeler arm pad *63*, Fig. 138, and during the time the box is swinging from one distributor to the other, the lifts idle three strokes.

Front and Back Plate Pawls.—There are two pawls, one of which is indicated at *78*, Fig. 135, pivoted on the shoulder screw *79* and held down by the small U-spring *80* set into recesses in the pawls and the upper rails. The distance between the end of the pawl and the vertical faces of the lower rails *67* is wide enough to permit a thick matrix having .090″ lugs to pass. The pawls have a slight pressure through the spring *80* upon the tops of the lower matrix lugs and prevent any tendency of the first few matrices in the line to jump against the bar point *69*.

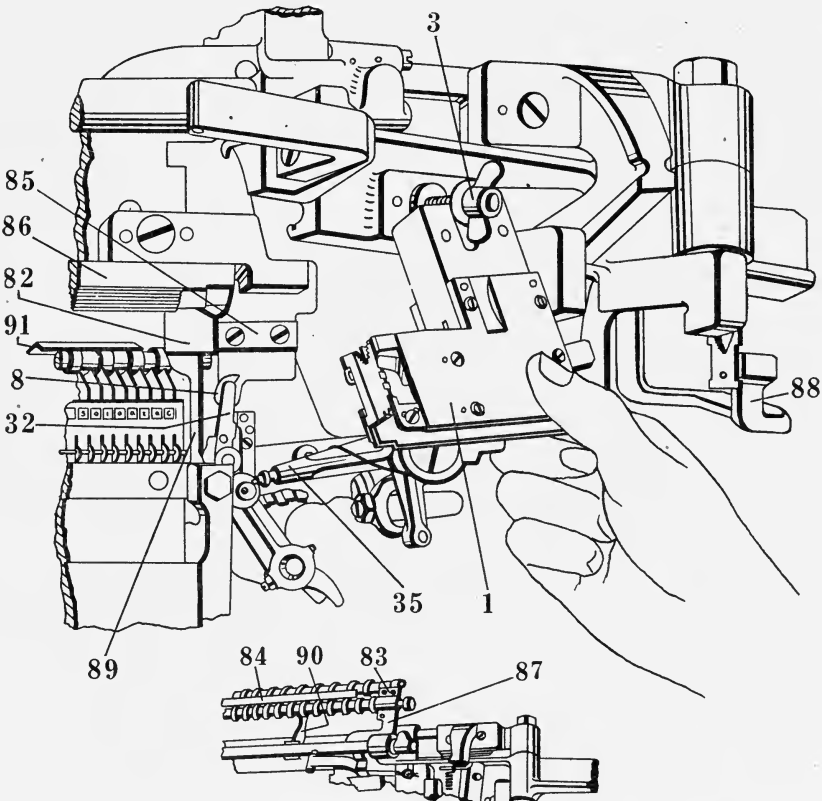


FIG. 137.—The Mixer Distributor Box *1* may be taken from its seat on the swinging arm by loosening the wing nut *3*. After stopping the distributor, trip the clutch to throw the feeler points and lifts clear of the box lower rails, retract the shifter *88*, raise the rear conveyor screw bracket *87* and lower the cam lever *35*. It will be noticed that the lift *32* and the cam lever *35* do not form a part of the distributor box *1*, but are mounted separately in a bracket below the box.

In this view are also shown the distributor lift or stationary rails *82*, *83* and *85*, which receive the matrices as the distributor box raises them into the conveyor screws. The matrices then travel a short distance upon these rails until after their teeth engage the teeth of the distributor combination bar *86*. These

rails rest in alignment slots and are held in a fixed position by screws. The center lift rail *82* is mounted upon an upright extension of the font selector bracket *89*, and each side of the lift rail forms the second rail for each distributor, that is, in the case of the lower distributor, one matrix upper lug is supported by the rear side of the center lift rail *82*, and the other upper lug is supported by the back lift rail *83* shown in raised position between the two back conveyor screws (detail drawing). The front side of the center lift rail (the side farthest away in the rail block *82*) and the front rail *85* form the pair of lift rails which receive matrices as the lift raises them from the distributor box into the conveyor screws. The rails then guide the matrices as the screws urge them forward, so that by the time they have reached the combination bar, and just before leaving the rails, the matrix teeth will be in perfect alignment with the bar teeth.

At *84*, (detail drawing) the screw guard projects from between the lower magazine conveyor screws. One of the brackets supporting the guard *84* is shown at *90*. The upper magazine screws have a similar guard *91*. The screw guard partly covers the top of the lower conveyor screw, and as matrices drop from the combination bar into the channel entrance, the upper matrix lug will strike the guard to flip the upper part of the matrix away from the lower distributor screw threads, which action avoids frequent distributor stops that might be caused by the lower screw thread impinging a matrix against a channel entrance partition.

Adjustments for the Mixer Distributor Box

There are several adjustments for the Mixer distributor box which require occasional attention to keep the mechanism functioning properly.

Adjustment of the Lifts.—The lifts *31* and *32*, Fig. 136, are made in one piece and operate in an identical manner. Adjustment of the stroke of one lift to properly raise matrices into the conveyor screws is equivalent to adjusting both lifts. The adjustment is made with the screw *40* held in place by a jam nut, so that when the cam lever roller *42* is resting against the low part of the cam *43*, the lifting lip of the lift *32* will be 1/64″ below the bottom of the matrix about to be raised. Ordinarily this will raise matrices high enough to clear the tops of the lift rails, *82* and *83*, Fig. 137, by 1/32″ at the extreme upstroke of the lift.

The Safety Spring, *41*, Fig. 136, is interposed between the cam and lift levers to provide a cushion overthrow should any obstruction, such as a binding matrix, interfere with the free upstroke of the lifts.

The Matrix Lift Cam Lever Spring, *36*, Fig. 136, should have enough tension to cause the cam lever roller *42* to follow the dip of the cam snugly. The matrix lift lever yoke stud *38* has a jam nut (not shown) holding its adjustment on the front side of the bracket *37*. Loosen this nut and turn the yoke stud *38* until the spring *36* exerts the proper tension against the cam lever *35*. The spring *36* has another function, that of preventing the cam lever *35* slipping on the yoke stud *38*, out of engagement with the lift lever yoke at the place where the pin *39* engages the yoke. The coils of the spring *36* can be opened sufficiently to hold the cam lever against the stresses exerted by the cam *43*.

The Lower Rail Block.—While in operation, one of the lifts *31* and *32* (according to which position the box is in) bears against the lower rail

block *66*, Fig. 136, through tension of the lift spring *34*, so that the lifting lip of the lifts will "bite" a matrix about .028″. The position of the block *66* is slightly adjustable by loosening the screw which it straddles. When one face of the lower rail block *66* has become worn, the lift will have too much "bite" upon the matrix. The block can be turned around to present a new bearing

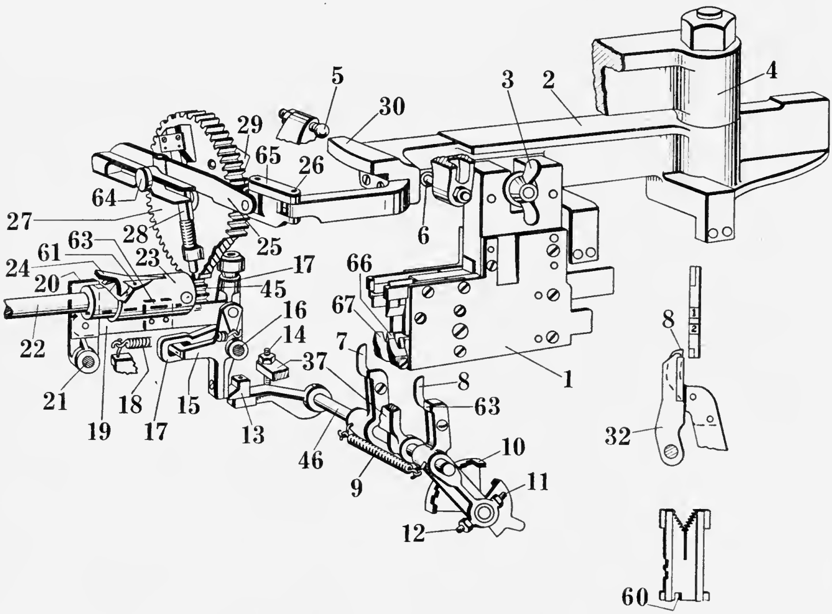


FIG. 138.—Rear View of the Mixer Distributor Box Clutch, which swings the distributor box from one distributor to the other, together with the detailed parts utilized in shifting the box.

As previously explained, the changing of the box from one distributor to the other is governed by the location of a small notch *60* in the lower edge of the matrices. The notches are cut in position according to the magazine in which they are to be distributed.

Mounted in a bracket upon a shaft *46*, directly under the distributor box *1*, are two upwardly projecting arms terminating in feeler points 7 and *8*. One of these feelers *8* (for the lower magazine) is positioned between the box lower rails *66* and *67*, alongside and a little in advance of the distributor box lift *32*, shown in the detail drawing. As the matrices are lifted into the distributor screws, the notch *60* passes over the point of the feeler *8* and the clutch remains inactive so long as the matrix notch *60* registers with the feeler point *8*. If, however, a matrix is intended for the other magazine and does not register with the feeler point *8*, which is a little in advance of the matrix lift, the matrix bears against the point *8* and tilts the tripping lever *13* (pinned to the shaft *46*) downwardly and out of engagement with the operating lever *15* before the lift *32* can start raising the matrix into the distributor screws. This action throws both feeler points 7 and *8* outside the lower box rails *66* and *67*, and the matrix lifts are also caused to swing outwardly by the arm upon which the feeler is mounted, through contact with the pad *63*, and the box *1*, attached to the swinging arm *2* shifts to the other distributor, the lower box rails *66* and *67* will not strike the feeler arms or the matrix lifts.

The action of the matrix bearing against the feeler points *8* tilts the feeler arm and causes the tripping lever *13* to become disengaged from the operating lever *15*, starting the box shifting clutch in motion. When the tripping lever is disengaged downwardly from the lower end of the operating lever *15*, the spring *18* pulls the lower end of the operating lever *15* against the beveled top of the block on the tripping lever *13*, and the clutch cam lever *17*, which is a part of the operating lever, both being pivoted on the stud *16*, bears inwardly against the side of the shifter gear *27*. Connected to the cam lever *17* by a link *19* is a pawl lever *20*, pivoted upon a shoulder screw *21* extending into the beam casting. Fastened to the operating link *19* is a plate *63* called a clutch stop. When the cam lever moves against the side of the shifter gear *27*, it moves the pawl lever *20* and the clutch stop *63* endwise from in front of the clutch pawl or butterfly *24*, which in the drawing is shown in top position on the spool *23*. The pawl *24* is pivoted at *61* and there are two small springs, one under each wing of pawl *24* that cause the opposite end of the pawl to be depressed and engage the continuously revolving clutch driver (not shown) which is pinned to the clutch driving shaft *22* passing through the spool *23*. The spool *23*, mounted upon the continuously revolving shaft *22*, has fastened at one end a small shifter pinion *45*, meshing with the large shifter gear *27*. The gear *27*, now being set in motion by the shifter pinion *45*, starts to shift the distributor box from one distributor to the other. Upon the gear *27* is fastened a stud *64*; connected to the stud is a link *25* which through a link connection *65*, moves the box arm *2* which is pivoted upon a stud in the beam *4*.

The stroke of the box arm *2*, upon which is mounted the distributor box *1*, is limited for the upper magazine by the stop screw *5*, and for the lower magazine by the stop screw *6*. The box arm *2* has upon the end opposite the pivot bearing a machined extension *30* which fits into a slideway in the distributor beam, forming a support for the shifting end of the arm. The extension *30* bears against one or the other of the stop screws *5* and *6* to regulate the position of the distributor box with either of the two distributors. As the box arm *2* brings the box to position, the gear *27* has made nearly one half a revolution, and the small pinion *45* has made three revolutions.

Upon the outside face of the shifter gear *27*, near the rim and opposite each other half-way around the gear, are two small cams, one of which is indicated at *29*. As the shifter gear *27* is bringing the box to position, one of these cams *29* engages the roller mounted at the top of the cam lever *17*, moving the lower end of the operating lever *15* to normal position.

The feeler arms upon the shaft *46* now rock by gravity until the feeler points *7* and *8* have again assumed their normal position, also bringing the block on the tripping lever *13* to normal position, when the lower end of the operating lever *15* will be held against the block on tripping lever *13* by tension of the spring *18*.

At the instant the roller on the cam lever *17* is directly in engagement with cam *29* upon the shifter gear *27*, the block at the lower end of the operating lever *15* is held about 1/32″ clear of the end of the block upon the tripping lever *13*, so that it will not interfere with the return by gravity of the feeler arms upon the shaft *46*.

When the cam *29* upon the shifter gear *27* engages the roller at the top of the cam lever *17*, the link *19* moves the pawl lever *20* back to its original position so that it will depress the pawl *24* in the spool *23* which causes the opposite end of the pawl *24* to become disengaged from the clutch driver fastened to the shaft *22* inside the spool *23*. At the same time the link *19* moves the pawl lever *20*, the clutch stop *63* being fastened to the link, also moves in the path of the end of the pawl which has been in engagement with the clutch driver. As the pawl *24* revolves with the spool *23*, the pawl lever *20* depresses the left end (viewed from the rear) of the pawl *24* and disengages the other end from the clutch driver, so that it extends outside the spool, due to the action of the two small springs under the pawl wings, and strikes the top of the pawl stop *63*. The clutch is now in normal position.

for the lift. A *trace* of oil should be applied to the lower rail block *66* to reduce any friction which might be set up if the parts are dry.

Matrix Leveling Plate

There is a matrix leveling plate mounted at the under side of the middle conveyor screw bracket and its two prongs extend along the screw threads just above the distributor box upper rail buffer. Each prong closes the gap between the upper rail buffer and the lift rails. When the box is at the front distributor, the front prong of the leveling plate helps the matrix keep a vertical position while the lift is raising it into the distributor screws. Likewise, the rear prong of the plate supports the front upper matrix lugs when the lift is raising matrices up to the lift rails and into the conveyor screws. This plate needs no attention.

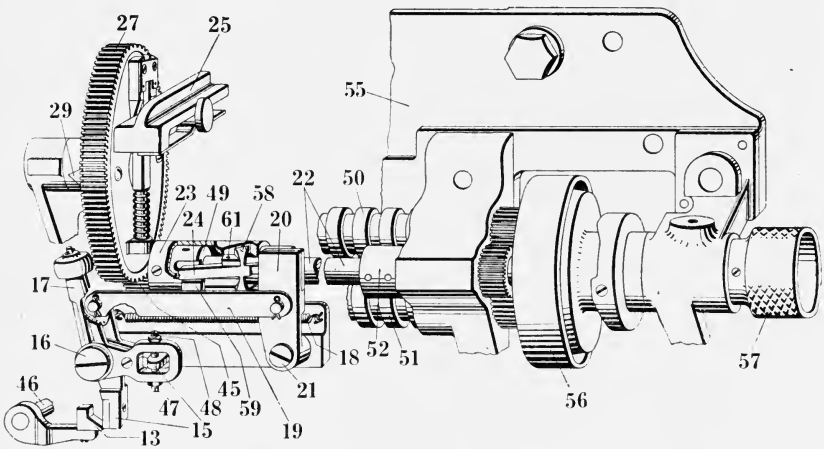


FIG. 139.—Front View of the Mixer Distributor Box Clutch Mechanism in normal position. The spool *23* has been broken away to show the parts within. The box clutch shaft *22* extends from the left side of the distributor to a bearing in the right side of the distributor beam, and is connected to the distributor clutch shaft by a coupling *52* and taper pins, one pin for each shaft. The shaft *22* passes through and supports the spool *23* and the pinion *45*. The clutch driver *49* is pinned to the box clutch shaft *22* within the spool *23*. While the box clutch is standing at normal position, the shaft *22* and the clutch driver *49* are continuously revolving. The small pinion *45* is attached to the spool *23* by a sleeve fitting into the end of the spool.

The clutch pawl or butterfly *24* is pivoted in a slot in spool *23* at *61*. Two compression springs *58* pocketed in holes in the spool bear against the two wings of the pawl or butterfly *24*. While the clutch is standing at normal or inoperative position, the short lug of the pawl *24* is depressed by the pawl lever *20*, and the long end rests upon the top of the pawl stop *59* so that the revolving clutch driver cannot engage the end of the pawl *24*.

When a matrix bears against a feeler point *7* or *8*, Fig. 138, it causes the feeler arms to rock within a small arc of a circle upon the shaft *46*, (this figure) and the tripping lever upon which is mounted the beveled block *13* is also caused to move downwardly and out of engagement with the lower end of the

operating lever *15*. The operating lever *15*, forms a part of the cam lever *17* through an eye extension with adjusting screws *47* and *48* in the cam lever so that they act as one lever. As the tripping lever moves down, the lower end of the operating lever *15* is caused to move to the left (front view of the machine) over the beveled part of the block on tripping lever *13*. At the same time the cam lever *17* moves inwardly against the side of the large shifter gear *27*. The movement of the cam lever *17* compels a movement to the right of the pawl stop *59* on link *19* through tension of the spring *18*, and the pawl lever *20* connected to the cam lever *17* by the link *19*. This releases the pawl *24* engaged with the revolving clutch driver *49* starting the pinion *45* at the end of the spool *23*, and in turn revolving the shifter gear *27*. The shifter gear *27* is connected to the swinging distributor box arm by the link *25*.

The small pinion *45* and the shifter gear *27* is a 6-to-1 combination. The shifter gear in changing the box from one distributor to the other, turns one-half revolution and the small pinion *45* revolves three times. At each revolution of the spool *23* carrying the pawl *24* the pawl lever *20* and the pawl stop *59* are held to the right of the pawl through tension of the spring *18* connected to the cam lever *17*. As the distributor box comes to position at one of the two distributors, a cam *29* on the side of the shifter gear *27* engages a roller at the top of the cam lever *17*, moving it outwardly. This action of the cam lever draws the pawl stop *59* and the pawl lever *20* back to the left and the next time the pawl *24* in the spool *23* comes over the top, the pawl lever *20* depresses the right lug of the pawl *24*, overcoming the stress of the pawl springs *58*, so that as the left lug of the pawl is disengaged from the clutch driver *49*, it strikes the pawl stop *59* and the clutch comes to a stop.

Adjustment of Mixer Distributor Box Position.—The distributor box is adjustable by screw *5*, Fig. 138, for position at the front distributor and screw *6* for position at the back distributor, so that matrices will pass freely from the lifts to the stationary rails. The box arm slide *30* bears against one of these screws according to the distributor which is in use. The box rests at an angle of 4½ degrees to the screws and matrices being lifted into the distributor screws turn very slightly from this angle to align with the screws. In order to test the position of the box, put a thick matrix (one whose body extends forward of the lugs, like a 36-point capital "M" or "W"); raise it from the box by the lift as the distributor is turned slowly by hand; when the matrix rises and passes freely into the screws, the box setting will be correct. Adjust the screws *5* and *6*, testing the box position adjustment separately at each distributor until the matrix passes freely, as instructed above.

Adjustment of the Feeler Points.—The upper magazine feeler point *7*, Fig. 138, and the lower magazine feeler point *8*, are separately adjustable by screws at the lower end of the arm. It has been explained that the feeler points, *7* and *8*, must be a little in advance or to the right of the matrix lifts, *31* and *32*, Fig. 136 (viewed from the back of the machine). In this way, a matrix for the upper magazine, in case the box is in lower distributor position, will bear against the feeler point *8*, Fig. 138, and trip the clutch before the lift *32*, Fig. 136, can lift it into the lower distributor conveyor screws.

The setting of the feeler points can be accomplished as follows:

It is the usual thing to adjust the lower magazine feeler *8*, Fig. 138, first, by having the box in position at the lower distributor. Throw off the distributor belt; place a thin space matrix (one about .028″ thick) from the lower

magazine in the box and follow it with a lower case "m" matrix from the upper magazine. Slowly turn the distributor by hand until the lift has raised the matrix high enough to clear the tops of the lower rails *66* and *67*, when the second, or thick matrix from the upper magazine should trip the tripping lever *13*, by advancing against the feeler point *8*. The tripping lever should not be thrown out of engagement with the operating lever *15* until after the thin space matrix clears the tops of the distributor box lower rails *66* and *67*, and the matrix should trip the clutch immediately after the thin space matrix has cleared the lower rail tops. The position of the feeler point *8* is regulated by screws *11* and *12* in the feeler arm. After the correct adjustment of the screws *11* and *12* has been secured, back one of them about one-eighth turn away from the font selector arm center rod, so that when changing a magazine containing matrices with a different font notch, the arm will slide easily lengthwise upon the rod, thus permitting the sector *10* to be changed to another notch which controls the position of the feeler point *8*, endwise on the rod in relation to the different selector notches *60* cut in the lower edge of the matrices.

The adjustment of the upper magazine feeler arm can now be made, using for the first matrix a thin space about .028" thick from the upper magazine, followed by a thick matrix, such as a lower case "m" from the lower magazine. Trip the box clutch by hand and turn the distributor until the box is in position at the upper distributor. Then pass the two matrices into the distributor box and adjust the upper magazine feeler point *7* in the same manner as described for the lower magazine point *8*.

If the machine does not contain .028" or .031" thin spaces, it is a good plan to have them on hand for making adjustments. The selector notches may be cut in the bottom of the matrices by hand.

Setting the Feeler Points.—So that the feeler points *7* and *8* may be positioned correctly according to the location of the notch *60* in the bottom of each matrix when a magazine is changed, the feeler point arms are adjustable. The feeler arm has a pin (not shown) extending from its body which registers with one of the notches in the rim of the sector *10*. The spring *9* fastened to hooks in the feeler arms, holds the pin in each arm against notches in the sectors *10* (the one shown is for the lower magazine). To change the setting of the feeler arm, pull it out slightly on the shaft *46* until the pin is disengaged from the sector notch, turn the sector *10* to the proper notch bearing. The lower portion of the sector is indexed with graduations for all selector notches; the feeler arm is released after locating the proper setting and the pin in the feeler arm will be held against the sector notch by spring *9*.

Adjustment of the Box Clutch Tripping Lever.—The two font selector arms having feeler points *7* and *8*, Fig. 138, set in their upper ends, and the tripping lever *13* are all mounted upon the tripping lever shaft *46*. When a matrix throws the clutch into motion, the block on the tripping lever *13* falls

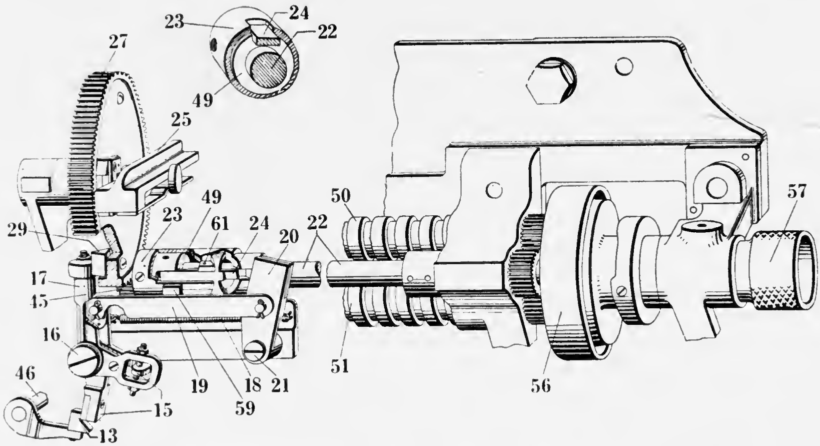


FIG. 140.—View of the Distributor Box Clutch in Action. The spool *23* is broken away to show the means of engagement of the clutch driver *49* with the pawl *24*. In the small detail of the clutch, *23* is the spool, *24* is the pawl or butterfly, *22* is the distributor box clutch driving shaft, and *49* is the clutch driver pinned to shaft *22*. As will be noticed, the clutch driver is eccentrically shaped so that the driving point will have a positive engagement with the lug of pawl *24*. As the large shifter gear *27* is making one-half a revolution to change the distributor box from one distributor to the other, the spring *18* holds the cam lever *17* at the side of the gear; at the same time the pawl lever *20* and stop block *59* are held through connection with the link *19* to the right and clear of the pawl *24*. As the large shifter gear *27* comes to the end of its one-half turn, one of the two cams *29* engages the roller at the top of the cam lever *17*, moving the pawl stop *59* and the pawl lever in the path of the pawl *24* so that as the spool revolves, the pawl lever *20* depresses the right lug of the pawl *24* and moves the left end out of engagement with the clutch driver *49* which then strikes the pawl stop *59*.

In moving the cam lever *17* out, the action of the cam *29* on the side of the large shifter gear also moves the lower end of the operating lever *15* to the right, permitting the feeler arms to describe a small arc and come to normal position by gravity. While the cam *29* is directly in engagement with the roller on the cam lever *17*, the lower end of the operating lever *15* is held about 1/32″ clear of the tripping lever *13* to insure it coming fully up to position. As the cam *29* passes out of engagement with the cam lever *17*, spring *18* pulls the lower end of the operating lever *15* against the end of the block on the tripping lever *13*, and holds it in that position until a matrix bears against a feeler point the next time the box is to be shifted to the other distributor.

out of engagement with the operating lever *15*. The normal position of the tripping lever *13* is regulated by the screw *14* in the font selector bracket *37* and should be set so that the block on the operating lever *15* will engage the tripping lever block 1/32″.

Tripping and Cam Lever Adjustment.—There are two screws, *47* and *48*, Fig. 139, in the eye of the cam lever *17*, which should be adjusted so that when the roller on the cam lever *17* is in engagement with a cam *29* on the shifter gear *27*, there will be about 1/64″ space between the hardened block

on the lever *15* and the end of the hardened block on the tripping lever *13*. The weight of the font selector arm assembly causes the feeler points *7* and *8* to assume their normal position by gravity, and the operating lever *15* must not interfere with the upstroke of the tripping lever *13*. The adjustment of

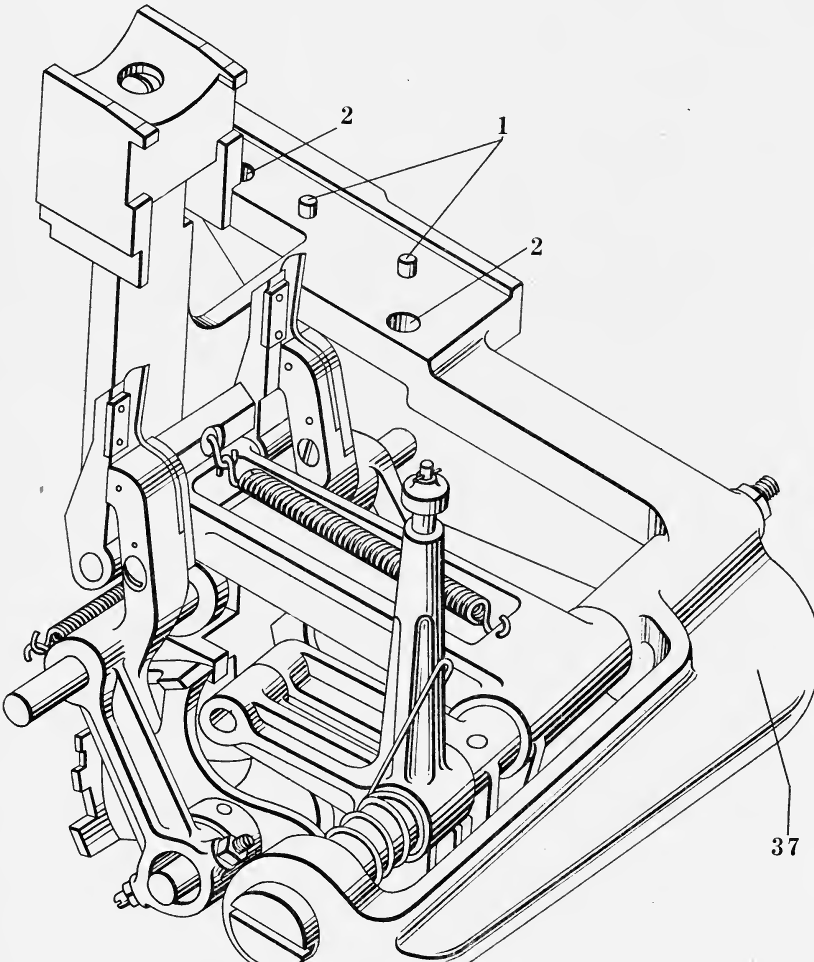


FIG. 141.—Back View of the Mixer Font Selector Block. The dowel pins *1* and *1* and the projecting shoulder along the front edge accurately locate the bracket in position. The two holes indicated at *2* and *2* receive screws which fasten it to the distributor beam casting. The assembled bracket *37* may be taken from the machine for cleaning and repairs by latching back the distributor shifter slide; then remove the distributor box, tilt back the magazine frame and take out the two screws *2* and *2*.

the normal position of the tripping lever *13* always involves readjustment of the feeler points *7* and *8*. The tripping lever will not need adjusting except at exceedingly long intervals unless careless handling destroys the adjustment.

Adjustment of the Shifter Gear Cams.—On some of the first Mixer Intertypes, the cams *29*, Fig. 138, are adjustable. The screw holding the cam in position passes through a slot in the side of the shifter gear *27*. They should be set when the clutch is standing at normal, according to which distributor is in use, so there will be about ⅜″ space between the cam *29* and the roller on the cam lever *17*. The cams now applied to the shifter gear are fixed as to position and are not adjustable.

Font Selector Arm Lift Clearance Pad.—At the top of the rear font selector arm, there is a small extension or pad, *63*, Fig. 138, which has contact with the rear distributor box lift *32*, Fig. 136, and holds both lifts out and away from the lower distributor box rails *66* and *67*, Fig. 136, while the box swings from one distributor to the other. When these parts are in normal operating position, there should be a space between the lift and arm extension not to exceed .010″. If this space is much wider, the arm may not throw the lifts away from the first matrix in the box before it will have started to lift it into the conveyor screws. Although it is not probable that this space will ever be wider than .010″, it should be checked over after any repairs or renewals of parts have been made. If the feeler points *7* and *8*, Fig. 138, have been unnecessarily filed and the arms readjusted to suit the filed points, naturally the space between the lift and the pad of the rear font selector arm would be too wide. The remedy then would be to apply new feeler points, or if these are not at hand, solder a small piece of thin brass or bronze on the extension or pad *63*, mentioned above.

Timing the Clutch Action.—The distributor conveyor screw threads should close in on a matrix and start pushing it along the lift rails, *82*, *83* and *85*, Fig. 137, before the distributor box starts to swing from one distributor to the other. If the box starts shifting position too soon, the tripping of the clutch can be delayed by drilling and reaming a new hole in the driving shaft coupling *52*, Fig. 139. There is a small set screw in the coupling which will permit altering the position of the shaft in the coupling in relation to the distributor driving clutch shaft at the other side of the coupling.

Some Notes on the Mixer Distributor

If excess oil has fouled the distributor screws, clean them with strips of cloth saturated with gasoline. The middle conveyor screw, while running under power, can be cleaned with a watchmaker's brush. Before cleaning the screws, cover the channel entrance and the tops of the magazines with wiping cloths or newspapers.

Wipe the top of the second elevator bar plate clean and keep a thin film of oil spread over the top so the bar plate will pull back into its seat properly. If it becomes dry and gummy, the end of the second-elevator bar will not

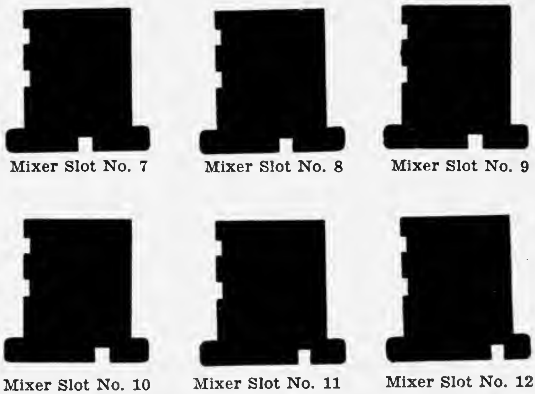


FIG. 142.—Intertype Mixer Notches. Here are shown locations of Mixer notches for Intertype machines. While six different notches are shown, it is the usual practice to use notches No. 8 and No. 11—No. 8 for all upper magazine fonts and No. 11 for all lower magazine fonts, both main and side magazines.

However, to enable customers having matrix sets with different slots to sort out odd matrices, any other two notches are used, provided they are at least two numbers apart, as for instance 7 and 9, 10 and 12, etc. The regular narrow font slot for single distributor matrices has nothing whatever to do with separation on Mixer machines.

match the outside end of the distributor box bar, and matrices will not transfer into the box freely.

See that the taper pin holding the tripping lever upon its shaft has not worked loose before attempting to set the feeler points. When adjusting the feeler points, take up all lost motion of the arms upon the shaft by turning the adjusting screws against the shaft and then back one of them away about one-eighth turn.

If a feeler point becomes bent, the distributor box will be caused to work back and forth constantly, just the same as if a wrong font or reversed matrix should be put in the line. The point can then be straightened with a pair of duckbill pliers.

Do not trip the font selector arms by hand while matrices are being raised by the lift into the distributor screws, for the reason that one of the feeler points may become bent.

The clutch should not be tripped and thrown into action until a matrix has been started forward upon the lift or stationary rails by the conveyor screws.

If a matrix fails to be lifted into the screws, possibly the lift does not have enough bite upon the matrix. The small block which regulates the inward position of the lifts may be adjusted to permit the lift to project under the matrix about .028″, or the thickness of an average 6-point thin space.

The tension of the distributor box bar point spring must not be so strong that the lift will stall while raising a thick matrix into the distributor screws.

The spring on the shifter gear link slide provides a cushion overthrow for the distributor box as it comes to position. The spring on the shifter link permits the link to become disengaged from the shifter gear stud in case of a jam caused by the box parts striking an obstruction while swinging from one distributor to the other.

The Distributor Conveyor Screws

The distributor screws, as has been explained, convey matrices along the distributor bar until the proper tooth combination on the bar, corresponding to that of the matrix has been reached, when they drop from the bar by gravity and out of engagement with the conveyor screws, into the channel entrance.

The screws have what is called a buttress thread (wide face and base with slightly tapered sides). On equipments A, B, C, D and X, the two front screws run in fixed bearings and the back screw is mounted in a hinged bracket which can be raised after depressing a spring catch *16*, Fig. 127, at the distributor box lift side of the beam. The spring catch for the back screw bracket on the Mixer machine is located at the clutch side of the distributor beam. The back screw bracket is movable for the purpose of inspecting the combination bar and in case a matrix becomes twisted upon the bar the matrix can be released by gently manipulating it with the fingers after the back screw has been raised. It is not good practice to raise the back screw when there are a number of matrices upon the bar, as it requires some patience to time the gear again and have all the matrix lugs properly engaging the screw threads when the hinged back screw is closed again. With all the adjustments in proper order, the back screw will never need to be raised except at infrequent intervals.

The rear screw is driven by a pinion which engages gears fastened to the two front screws. Since all the screws must move in unison, the back screw gear has a pin or tooth inserted between two of its teeth and this must match a corresponding blanked out tooth in the gear which it engages.

Adjustment of the Distributor Beam

All distributor beams now made are adjustable for endwise position and for height, so that as matrices drop from the combination bar they will clear the channel entrance partitions. The means of endwise adjustment is illustrated in Fig. 143.

The first distributors were doweled to the bracket and are not adjustable. However, the dowels can be removed and the adjusting device applied to any outstanding machine.

To adjust the beam, run several matrices upon the distributor combination bar, preferably from the lower case "f" channel, and turn the distributor

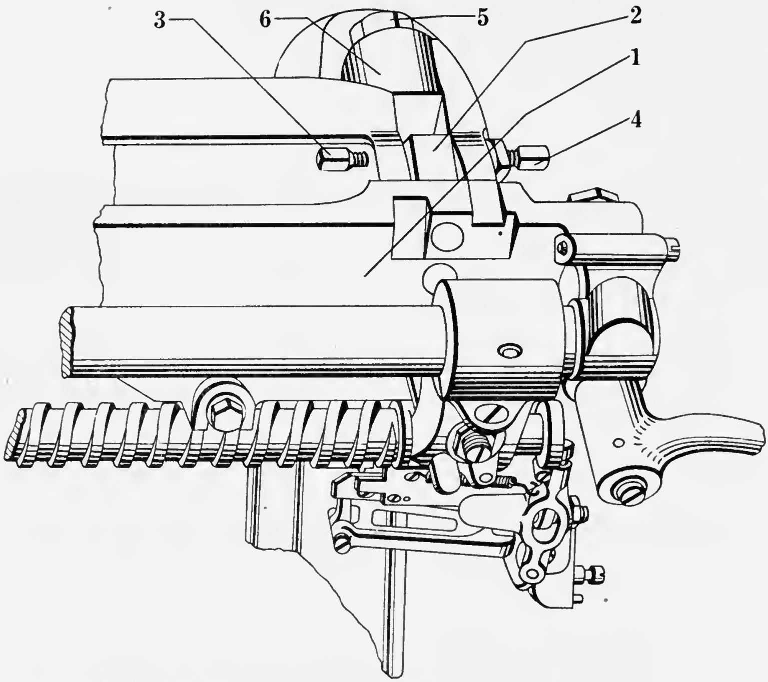


FIG. 143.—Means of Adjusting Position of the Distributor Beam, which is common to all machines, so the matrices will clear the partitions as they drop into the channel entrance.

slowly by hand. As the matrices drop while making the adjustment they should strike the top of the partition at the right of the channel in which they belong, then when the distributor is running under power, momentum will cause them to be thrown over toward the center of the space in the channel entrance into which they should drop. In the case of the first style four-pitch distributor, the matrices should *clear* the partition at the right of the channel in which they belong. It should be understood that the channel entrance is not to be adjusted to obtain proper clearance. *Always adjust the beam, because, if the channel entrance is shifted, the alignment of the entrance partitions with the magazine channels will be destroyed.* To adjust the distributor for proper clearance of matrices with the entrance partitions, always shift the beam by first loosening the two large hexagon head screws holding the beam *1*, Fig. 143, to the distributor bracket, one of which is shown at *5*. A tongue *2* is fastened to the beam *1* and projects into the bracket *6*. Two screws *3* and *4* regulate the position of the beam *1* through the tongue *2*. Screw *4* is provided with a check nut to hold its adjustment permanently. Both of the beam screws, one of which is shown at *5*, must be tightened again after the adjustment has been made.

Adjustment of the Beam for Height

The space between the top of the channel entrance partitions and the bottom of the matrices should be approximately 1/16″. If the occasion ever arises that the lower edges of the matrices strike the partition tops as the conveyor screws urge them along, the beam can be raised by turning the two adjusting screws by means of which the beam rests upon the distributor bracket. This adjustment, like some others, is primarily an assembling adjustment, that is, it is provided for use when the machine is first assembled at the factory.

Timing the Distributor Screws

If for any reason it is necessary to retime the distributor screws because the threads of all three screws do not engage the matrix lugs simultaneously, a test can be made by running a new and unused pi matrix upon the combination bar by hand. Hold a slim screwdriver against the upper front matrix lug or ear to cause the matrix lugs to bear against the screw threads while holding a small square against the bottom of the combination bar and the matrix body as shown in Fig. 144. This test will determine the accuracy of the position of the lower front screw in relation to the upper front screw and at right angles with the distributor combination bar. The square is held against the bar and if the matrix does not have a true position with the blade of the square, the pinion at the end of the screw can be shifted one or two teeth. In this case the original timing pin or tooth should be advanced or retarded according to which direction the screw will need to be turned.

It is beneficial to good distribution if the lower end of the matrix is advanced a trifle ahead of the upper end, but the lower part of the matrix must never be retarded in relation to the upper part.

To make a test of the crosswise position of the matrix in relation to the

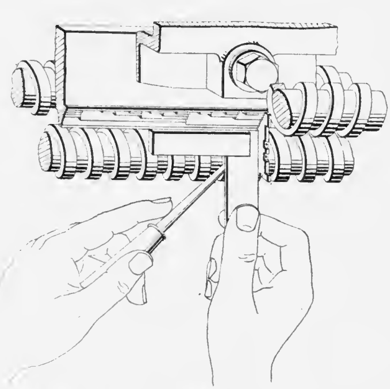


FIG. 144.—Testing the Distributor Screws to determine if all three threads engage the matrix lugs equally. Fig. 145 shows another position of the small square.

distributor screw threads, place a slim screwdriver so that its point will bear against the upper front matrix lug or ear. While holding in this position, place the small square horizontally against the lower front distributor screw, Fig. 145. When the blade of the square is against the matrix, both the matrix and the square blade should be parallel to each other, and at right angles to the lower front screw. To correct any inaccuracy, the back screw can be advanced or retarded by remeshing the screw gear and shifting the timing tooth.

Replacing and Timing Distributor Screws

After a number of years, under certain conditions, the distributor screw threads may become worn in one spot at the point where the threads engage matrices just after the lift has raised them into the screws. This applies to the first-style four-pitch screw. It is recommended that when worn to the extent that operation is noticeably impaired, the new style screws be installed.

Many Intertype customers have brought their distributors up-to-date by replacing the first-style 4 and 3½-pitch conveyor screws with the new style two-pitch screws, which replacement speeds distribution and extends the matrix range of the machine.

When ordered for replacement purposes, the screws are assembled with gears, since the gears are timed when applying them at the factory, and the timing pins are set in perfect register. In this manner the customer may purchase a set of three distributor screws and gears and apply them with full assurance that they are properly timed with the exception of the timing of the distributor box matrix lift cam. This cam is never assembled with dis-

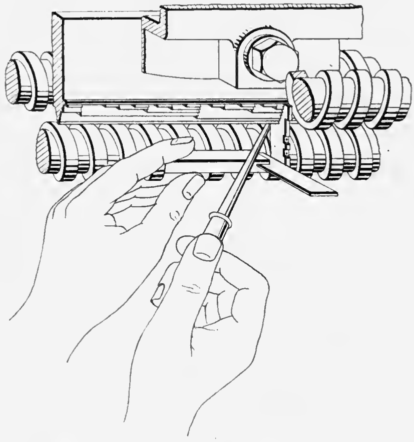


FIG. 145.—Testing the Distributor Screws in order to determine whether the threads of the screws engage the matrix lugs equally. Fig. 144 shows the upright position of the square.

tributor screws and the back screw is not drilled with a hole for the timing of the lift cam, which is to be applied after the new screws have been installed.

In the case of the unassembled screw, there are no holes drilled in the screw whatever, either for the gear or for the matrix lift cam.

It is recommended that if the customer desires to purchase and apply a set of distributor screws, the completely assembled screws with gears and

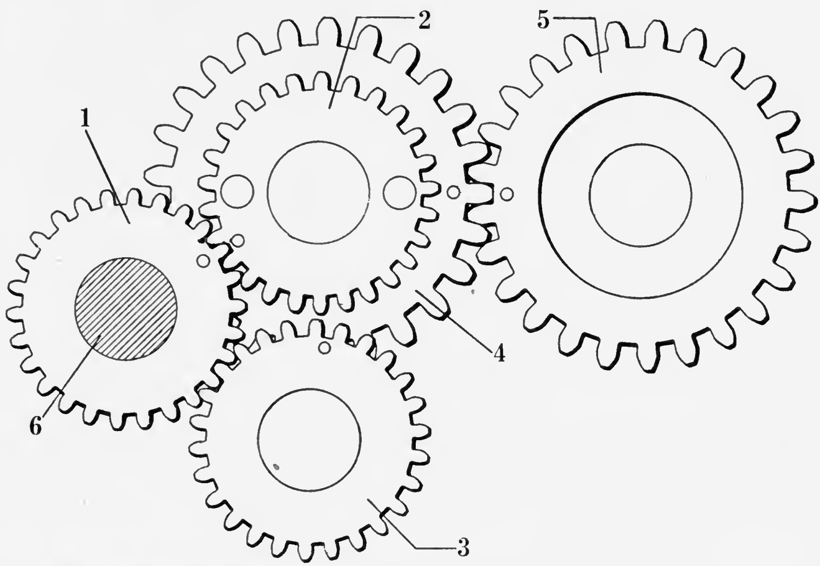


FIG. 146.—Assembly of Distributor Screw Gears shown in diagrammatic form, as used on single distributor Intertypes, and the means of timing them so the conveyor screws will run in unison. The arrow *1* points to the driving gear which is pinned to the clutch shaft *6*; *2* is the upper front screw gear, and *3* the lower front screw gear, both of which mesh with the driving gear *1*. It will be noticed that gears *2* and *3* do not mesh with each other. Attached to and forming a part of the upper front screw gear *2* is a larger gear *4*, which meshes with and drives the back screw gear *5*.

These gears are timed, that is, one gear will have a timing tooth and the opposite tooth in the gear with which it meshes, will be blanked out which permits the gear having the timing tooth to revolve in time with the gear with which it is meshed.

This timing arrangement of the gears is necessary, so that as the distributor screws revolve, each screw thread which engages a matrix lug will advance the matrix equally at all three points of engagement.

To aid in properly timing the gears when the clutch shaft *6*, upon which the driving gear *1* is fastened has been removed from the beam, the three gears *1*, *2* and *3* are marked with punch marks, which are indicated by the small circles inside the edge of the gears near the teeth. Upon reassembling the shaft *6*, gear *1* together with gears *2* and *3* should be meshed by forming the punch marks into the smallest possible triangle. The three conveyor screws will then be in time.

lift cam should be ordered. A large number of these screws have been applied and timed by customers.

Leveling the Distributor

Good distribution of matrices is dependent to a great extent upon the level position of the distributor. First of all, the machine itself should be tested by placing a small level upon the keyboard bracket before the keyboard has been applied, or upon the vise cap. Place the level in both left-and-right, and front-and-back positions. The level should always indicate a true front-and-back position, but the clutch side of the distributor may be a trifle higher than the box side, which will cause matrices to be supported by the lower distributor screw as they travel along the combination bar. Thin strips of leather or wood may be used to level the machine.

After having tested the machine as above, place the level lengthwise upon the back distributor screw to determine if the screws are properly leveled to correspond with the position of the machine. The distributor beam rests upon the distributor bracket by means of two adjustable screws at either side of the beam. If the machine is level and the conveyor screws are too low at the clutch side, adjust the outside beam screw.

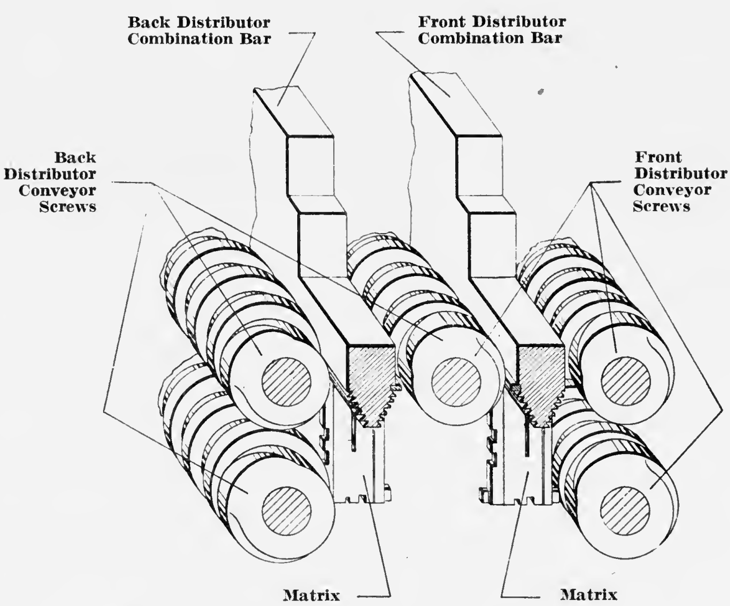


FIG. 147.—Mixer Distributor Conveyor Screws, shown in perspective view. The distributor bars with a matrix hanging upon each bar and the lugs of the matrices in engagement with the threads of the conveyor screws are also shown.

Distributor Screw Guard

Interposed between the two front distributor screws is a thin steel blade, called a distributor screw guard. The purpose of this guard is to slightly deflect the top part of matrices away from the lower screw thread as they fall into the channel entrance. In this way the lower screw thread will not engage a matrix upper lug and force it against a channel entrance partition and trip the clutch. This guard is especially valuable in preventing thick matrices from impinging against the channel entrance partitions.

The guard is sustained by two brackets set under nuts on the two screws which fasten the combination bar and extend through to the front of the beam.

Adjustment of the Guard.—The guard should be adjusted to position the inside edge of the blade approximately 1/32″ away from the matrices while on the combination bar. In setting the guard, run two new thick pi matrices upon the combination bar and have each one at opposite ends of the distributor. Loosen the screws holding the guard to the lower ends of the brackets and adjust it until the edge is about 1/32″ away from the matrices. If the setting of the guard is too close, matrices will be carried beyond their channels and will fall out upon the floor or be carried into the pi tube.

The screw guard for the Mixer machine back distributor has the same function and is adjusted in the same manner as the front distributor screw guard.

Keep the Distributor Screws Clean

It has been mentioned in several places in this book that surplus oil applied to the distributor conveyor screw bearings will flow out upon the ends of the screws and into the threads. This oil will then be transferred to the lugs of the matrices. Oil may also be caused to foul matrices, not only by an excess application to the screw bearings, but also by too free use of it in the assembler bearings and the mold wipers. A little care exercised on oiling day will obviate a lot of troubles. *Matrices will not drop freely from the magazine when their lugs have been fouled with oil.*

To clean the screws, open the channel entrance and cover it and the top of the magazine with a protective cloth; hang a weight upon the distributor clutch lever. While the distributor is running under power, strips of cloth or a watchmaker's brush saturated with benzol or high test gasoline may be used to clean off the oil. In any event, keep the screw threads clean and dry. The best plan is to avoid the application of too much lubricant from the oil can spout. A periodical cleaning is beneficial.

Removing the Mixer Distributor Beam

It is hardly possible that it will ever be necessary to remove the distributor beam from a Mixer machine except in the event the machine is to be moved to a new location.

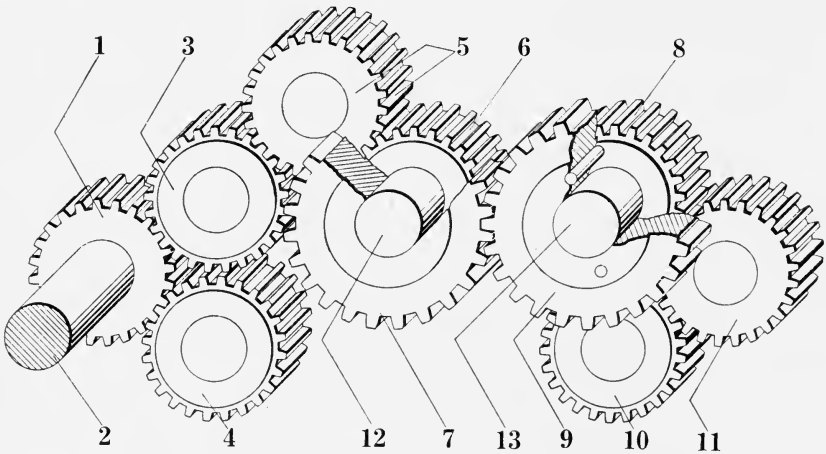


FIG. 148.—Distributor Screw Gear Assembly for the Mixer Machine. The distributor clutch shaft is represented at *2*. Upon this shaft *2* is fastened a driving gear *1*; *3* and *4* are the front distributor upper and lower gears respectively which are fastened to the ends of the conveyor screws. These gears are driven by the gear *1* upon the clutch shaft *2*, but do not mesh with each other. Meshing with the front distributor upper front gear is an idle gear *5* which transmits motion to the middle distributor screw gear *6*. As has been previously explained, the middle conveyor screw on the Mixer machine serves as the back conveyor screw for the front distributor, and at the same time it forms the front conveyor screw for the back distributor.

Motion is transmitted to the back distributor conveyor screws through gear *7* pinned to gear *6* on middle screw shaft *12*, and gear *9* pinned to gear *8* on the back distributor upper back screw shaft *13*. Gears *7* and *9* are equal in size and are used to connect gears *6* and *8*, so that gears *6*, *8* and *10* will revolve uniformly. Gear *8* is fastened to the back distributor upper back conveyor screw and meshes with another idle gear *11* which causes the gear *10* for the back distributor back screw to move in unison with the other screws.

The back distributor back screws are mounted in a hinged bracket and held in place by a spring catch so that the screw bracket can be raised for removal of the distributor box or other reasons. When meshing gear *9* with gear *7* after having raised the back distributor screw shaft or bracket, the two gears *7* and *9* must be timed, that is, the two punch marks in the side of the gears must coincide.

Preparations for the removal of the distributor from the bracket may be carried out as follows:

Back the machine by hand until the second elevator descends about six inches, open the channel entrance to second position, remove the distributor shifter slide stop screw in the box arm and disengage the shifter, remove the distributor box, take off the font selector bracket, turn out the screw holding the box arm stop screw bracket to the beam and lift off the bracket. Lower the shifter slide latch, turn the box arm around and disengage from the arm stud by lowering it, take off the distributor belt, disconnect the pi chutes from the pi stackers, slip the upper ends of the pi chutes from the pi chute

entrances, turn out the screws holding the pi chute entrance bracket to the support and take the bracket off by turning in a downward direction and working it from the clutch lever adjusting plate, remove the bracket support from the beam. Loosen the two distributor beam screws in the beam bracket, loosen the beam adjusting stud binding screw (the one without the nut). The two large hexagon head beam screws can now be taken out and the entire beam lifted from the bracket.

Chapter XXVII

THE CHANNEL ENTRANCE

One of the outstanding features of the Intertype machine is its variably spaced distributor combination bar and channel entrance, which provides the proper space for matrices to drop freely into and through the entrance according to the width of the matrix. A thin matrix, such as a lower case "i", does not require the same room to clear the partition space as a capital "W" matrix.

Another feature of the distributor is the floating or self-compensating channel entrance applied to all machines of the single distributor type. The entrance is pivoted in a frame at the rear and the position of the entrance in relation to each magazine is regulated independently by two locating fingers which project towards the front at each side and support the entrance directly upon the magazine in use.

The entrance proper is composed of a base plate slightly curved and suitably slotted to receive the partition lugs projecting through the slots in the plate. There are three lugs for each partition, two of which are hooked, and against the top one a locking rod bears to hold the partitions rigidly to the plate. The rod or bar is held in place by three screws in the plate brackets. The arrangement is such that the top part of the partition is flexible. The partitions are held in proper spacing to correspond with the bottom spacing by a locking strip *13*, Fig. 149, fitting over projections which pass through it into the strip. A locking rod *14* is then passed through the eyes of the partition lugs. The matrix guard *11* is hinged upon the rod *14*.

The lower ends of the partitions project into the magazine about one-quarter inch and assist matrices to slide properly into the magazine channels without tipping over.

There are several adjustments for the channel entrance, all of which are easily made.

Channel Entrance Sidewise Adjustment.—On a number of machines, the sidewise position of the channel entrance in relation to the magazine channels is regulated by the washers *25*, Fig. 149. The right side of the partition *1* (looking at it from the machine step) must be aligned with the magazine partitions *5* so there will be no obstruction to the free passage of a matrix into the magazine.

These washers, 25, are not to be used to obtain clearance for matrices dropping from the combination bar in relation to the partitions, but are intended solely to adjust the channel entrance so that partitions will exactly align with the points of the magazine channels. The position of the beam is adjustable sidewise as explained in the text for Fig. 143, in order that mat-

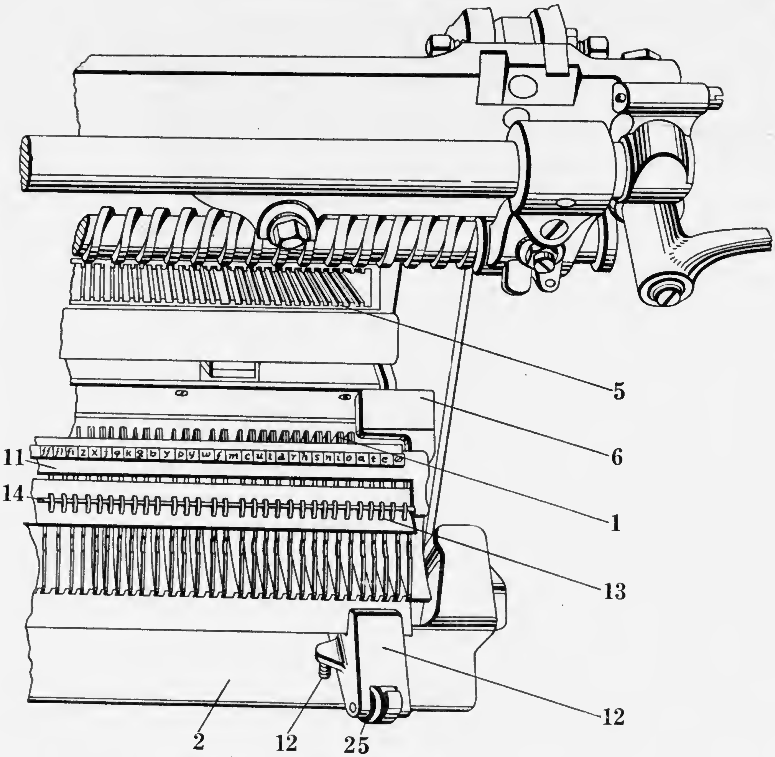


FIG. 149.—Single Distributor Channel Entrance, shown in open position. The entrance partitions *1*, extend into the magazine *5* when the channel entrance is closed and support matrices while passing to the magazine. There are fingers, (one of which is indicated at *6*) which rest upon and hold the channel entrance in proper relationship to the magazine. This is called the "Floating Channel Entrance."

rices will clear the partitions when dropping from the distributor bar and screws into the channel entrance.

On the late machines, a bushing is applied in place of the washers *25*. A pin passes through the frame lug and into the bushing from the top. This bushing can be removed by taking out the hinge screw and driving the pin into the screw hole of the bushing, should it ever be necessary to relocate the channel entrance partitions at the lower ends with the magazine channels. If the channel entrance is relocated, it will also be necessary to adjust the distributor beam a corresponding amount, Fig. 143.

To determine whether or not the lower ends of the channel entrance partitions register with the magazine channels, raise the hinged matrix guard at the top of the partitions, hold a light above the opening and look through the top of the channel entrance from the back.

Adjustment of Partition Feathers.—Channel entrance partitions are made in two pieces, the left-hand piece or feather (as you look at the entrance while standing on the machine step) is adjustable, that is, it can be bowed with a pair of pliers to narrow the channel space between the partitions in case thin matrices are in use. It is customary to adjust these feathers to let the thickest matrices pass through freely.

Later channel entrance partitions have thin spring feathers or springs attached by their upper ends, which are curled over at the top side of the lower end, Fig. 151. These partition springs or springy feathers keep the matrices in an upright position and guide them perfectly into the magazine. This type of feather is easily adjusted for position by drawing a pair of tweezers over the lower end only.

The advantages of the new style thin feather over the first style thick feather are obvious. Matrices are permitted to pass freely through the channel entrance into the magazine with a light guiding resistance which holds them upright.

The top edges of channel entrance partitions are knife-like so as to offer the least resistance to the dropping of the matrices.

The Floating Channel Entrance

The channel entrance on Equipments A, B, C, D and X is mounted upon fixed brackets or arms at either side of the distributor bracket and is hinged at the back in a frame. The front part of the entrance "floats," that is, it is supported by fingers projecting outwardly and resting at either side directly upon the magazine in use. The left-hand finger is shown at *6*, Fig. 150. This feature permits the entrance to adjust itself to each magazine in the cradle. There may be a slight variation in the operation position of different magazines, and these fingers make the entrance self-adjusting as to position in relation to the magazine in use.

Adjustment of the Floating Channel Entrance.—In Fig. 150, the channel entrance *1* is pivoted at *7* upon the frame *2*. The frame is hinged at *8* in the frame bracket *3* which is attached to the distributor bracket *4*. The front end of the channel entrance *1* is held in position at the upper end of the magazine *5* by the locating finger *6*. The partition plate should be a trifle higher than the bottom plate of the magazine. Due to careless handling, it may become necessary at long intervals to adjust the relationship of the position of the channel entrance with the magazine. This can be done by packing thin material between the partition plate of the channel entrance and the locating finger *6*. If the partition plate is too high and causes matrices to strike the magazine top plate, pack the locating finger to lower the position of the entrance. If the entrance is too low and matrices strike the magazine lower plate, the locating finger can be ground off at the bottom of the bracket part of the finger to raise the position of the entrance. Never attempt to bend the locating fingers because they are hardened and are likely to break if force is applied in an attempt to bend them.

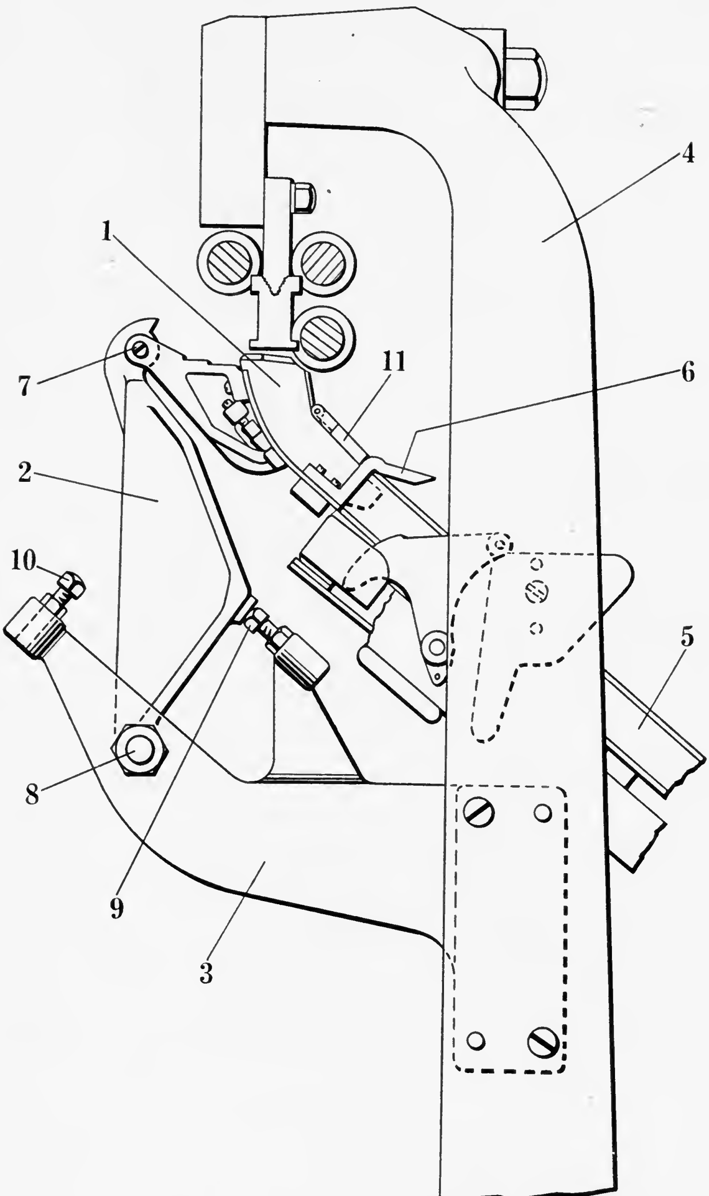


FIG. 150.—Endwise Diagram of the Single Distributor, Channel Entrance and Magazine. The means of adjustment are indicated by the figures, which are fully explained in the text matter.

The Hinged Matrix Guard, *11*, Fig. 150, should always lie down flat upon the tops of the partitions, otherwise matrices will strike the magazine top plate, and may cause distributor stops by clogging. Besides, the magazine top plate will be injured from the impact of the matrices striking them. This hinged guard is applied as a convenience in removing matrices after a distributor stop.

Closed Position Adjustment of the Channel Entrance.—When the channel entrance is in closed position, there should be a space of about 1/32″ between the partition plate and the magazine. This is regulated by the two screws in the frame bracket, against which the frame banks, one of which is shown at *9*, Fig. 150.

Open Position Adjustment of the Channel Entrance.—As the frame is resting at open position while clearing away a distributor stop or changing the magazine, it should bank equally upon the two screws in the left and right-hand frame brackets, one of which is indicated at *10*, Fig. 150.

There are two screws (not shown), one in either side of the frame, against which the left- and right-hand partition plate brackets bank when the entrance is in open position. These should be adjusted while the entrance is in closed position so there will be 1/16″ space between the partition plate brackets and the ends of the screws. This will insure non-interference with the function of the locating fingers.

Replacing a Partition

Occasionally, a channel entrance partition may need to be replaced, because of lost tension on account of too frequent adjustment, or a feather having become broken. Remove the channel entrance from the machine and take it to the work bench or table. Withdraw the top partition locking rod and the matrix guard. Carefully pry up the brass locking strip. Loosen the three screws holding the partition locking bar in place at the underside of the partition plate. With a light hammer and block of wood start the partition out by holding the wood block at the lower end and strike a smart blow with the hammer. Lift the partition from the plate and apply the new one, driving it to place with the light hammer and block of wood. Reassemble the parts in reverse order from that used in taking out the partition. When reapplying the brass locking strip, start it over the partition lugs at one end and carefully work down upon the lugs with thumb and fingers.

It is a good plan, in removing the partition locking rods, to start them out about one inch with a pin punch, then fasten the projecting rod in a vise and pull the entrance from the rod by hand. Be careful to protect the rod from the vise jaws with brass plates or other soft vise jaw liners.

Mixer Channel Entrance

The channel entrances for the Mixer machine are mounted in a single frame, and a means of independently adjusting the entrance for each maga-

zine is provided. The entrances are held in position at the tops of the magazines by two powerful counterbalance springs extending from either side of the frame to hooks in the distributor beam bracket. The frame which sustains the entrances is cast from an aluminum alloy and the springs just mentioned permit it to be opened and closed very easily.

The automatic stopping bar functions in the same manner as the bar used on the single distributor machine, but instead of having the saw-like teeth on one edge, there are lugs at the top edge extending equally from each side. This bar is set between and at the top of the channel entrances. Each lug extending from the front and rear of the bar engages one partition in each entrance.

The Automatic Stopping Bar, *1*, Fig. 157, rests against an adjustable plate *2* of the clutch lever *3* in the same manner as the single distributor stopping bar, but the parts are made in slightly different form.

The spring *5* fastened to the bar support *4* keeps the lugs of the bar *1* in normal position against the upper edges of the partitions in the upper magazine entrance and against the lower magazine partitions.

The lug on the end of the automatic stopping bar *1* should engage the hooked end of the clutch lever plate *2* about 1/32″. This adjustment is secured by loosening the screws holding the plate *2* on the clutch lever *3*.

The Channel Entrance Frame, *1*, Fig. 152, is pivoted on the front extremities of the two yokes. The right-hand yoke is shown at *3*. These yokes in turn are pivoted at *4* on two frame brackets *5* fastened to the distributor bracket

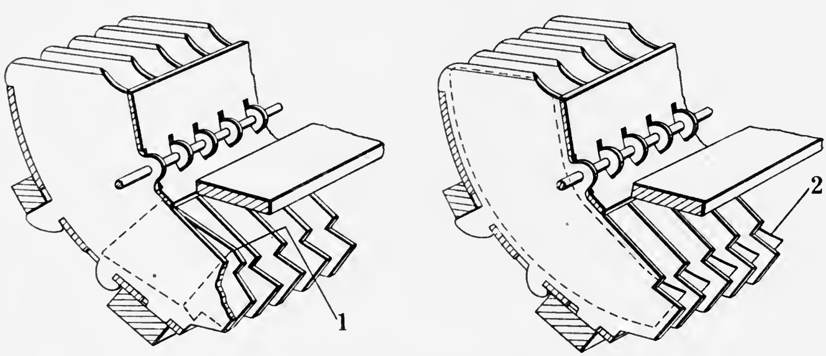


FIG. 151.—The First Style Channel Entrance Partition is indicated at *1*. This form of partition has the thick feather or spring, which is bent (shown in exaggerated form) to narrow the channel so that matrices will be properly guided into the magazine. It is customary to bend the feathers enough to permit the free passage of the largest matrices used in the machine. Although all partitions are fitted with the adjustable feather, it is necessary to narrow only a few of those channels through which the widest matrices pass.

At *2* is shown the new style channel entrance spring partition, fitted with the flexible spring or feather. The spring can be so curved at its lower end that it will permit the free passage of matrices of all thicknesses. Only the widest channels will require adjustment of the spring.

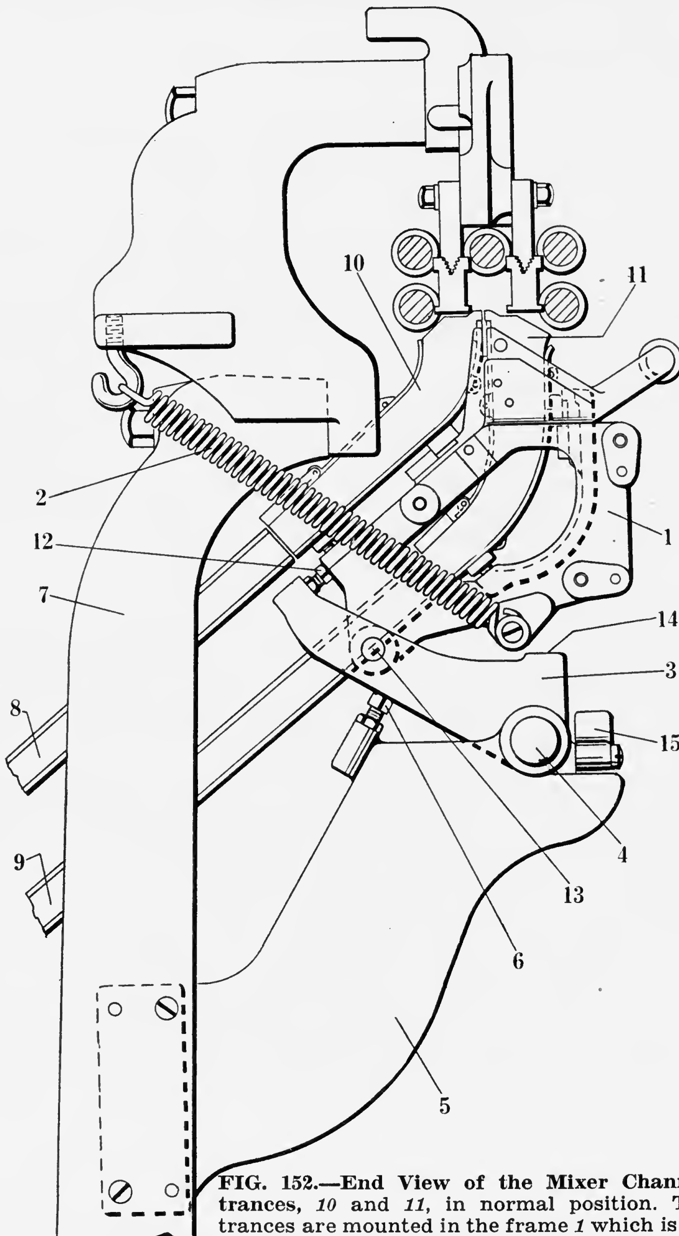


FIG. 152.—End View of the Mixer Channel Entrances, *10* and *11*, in normal position. The entrances are mounted in the frame *1* which is pivoted at *13* on the yokes *3*. The yokes are in turn pivoted at *4* in the brackets *5*. When the frame *1* is pulled downwardly through a small arc of a circle, it banks upon the stop *14* at the rear end of the yoke *3*, and with an uninterrupted motion, the frame *1*, due to

the leverage exerted by the yokes *3*, pivoted at *4* in the brackets *5*, swings down and entirely clear of the distributor, which makes the entrance accessible for the clearing away of matrices, should any clog a channel in one of the entrances *10* and *11*.

There is a small L-shaped block *15*, called the channel entrance auxiliary stop. This block limits the position of the channel entrance so that it will rest high enough to be clear of the top magazine when the frame is tilted backward in preparing to make a change of magazines.

7. The method of mounting the entrance frame *1* permits it to be swung down upon the yokes in an arc of a circle until it has cleared the lower back distributor screw; then it swings out with a large sweeping motion a considerable distance away from the conveyor screws.

One of the frame springs is indicated at *2*. These springs counterbalance the channel entrance in such a way that very little effort is required to open and close it.

Adjustment of Entrance to Magazine.—The two screws in the bracket *5* (one of which is shown at *6*) upon which the yokes *3* rest, are adjustable so that the lower edges of the entrances *10* and *11* will be positioned about 1/32″ away from the upper and lower magazines *8* and *9*.

The screw *12* in the right-hand yoke *3* forms a banking when the entrance

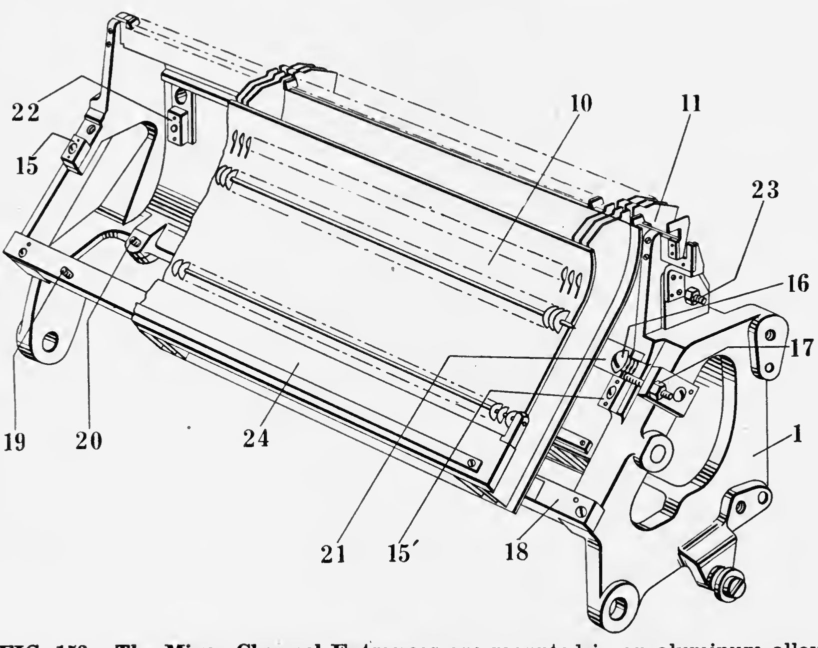


FIG. 153.—The Mixer Channel Entrances are mounted in an aluminum alloy frame and counterbalanced with suitable springs. This arrangement makes the opening and closing of the channel entrance an easy matter. The means of adjustment are fully explained in the text matter.

is being closed by its second or final stroke. Since its leverage is smaller than that of the yoke screws *6*, it can be manipulated to unequally tilt the relation of the lower ends of both entrances with the tops of the magazines. It should be adjusted until the lower ends of both channel entrances are in the same relation to each magazine.

Adjustment of Entrance with Magazine for Height.—The upper magazine partition plate or entrance bar *21*, Fig. 153, extends out from each side of the lower partition plate *10* of the upper magazine entrance and this bar rests upon the blocks *15* and *15'* at either side of the frame *1*. These blocks are doweled to the frame and determine the height of the tops of the partitions in relation to the distributor screws. The two screws, one of which is shown at *16*, pass through the bar *21* and hold the entrance to the frame. The lower edge of the entrance banks against and rests upon four small ad-

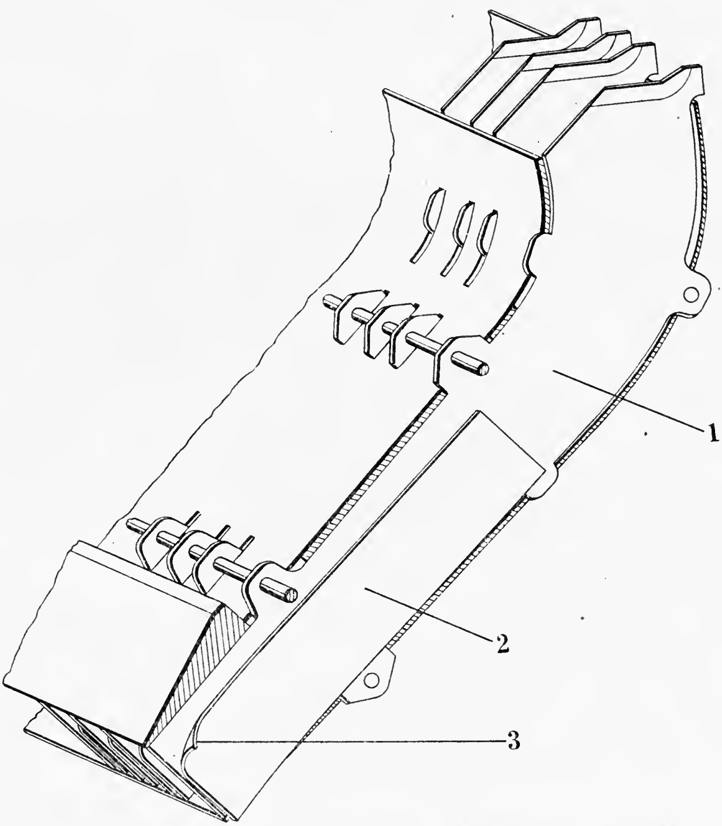


FIG. 154.—Upper Magazine Channel Entrance Partition for the Mixer machine, showing method of fitting the spring or feather so that it will extend out from one side of the entrance channel to guide matrices properly into the magazine.

justing screws in the tie rod *18*. One of these screws projects through the tie rod *18*, at *19*. These screws are adjustable to regulate the position of the lower plate of the upper magazine entrance *10*, so it will be just a trifle higher than the lower plate of the upper magazine *8*, Fig. 152. When properly adjusted, matrices will slide freely into the magazine.

Entrance Partition and Magazine Channel Alignment.—The upper entrance or partition plate *10*, Fig. 153, is adjustable for sidewise position by means of the screw and jam nut *17*. In order to determine the register of the lower ends of the partitions in the upper magazine entrance *10*, raise the matrix guard *24* while the entrance is closed, and look down from the top. The partitions *(not the partition springs or feathers)* should match the points of the magazine channels in the top of the upper magazine. If they do not match correctly sidewise, open the channel entrance frame, loosen the bar screws *16* and turn the adjusting screw *17*.

Adjusting the Lower Channel Entrance.—The lower channel entrance or partition plate *11* is fastened to the frame *1* in a manner similar to the upper magazine entrance. When preparing to adjust the position of the lower entrance *11*, first remove the upper entrance *10*, so that after raising the lower entrance matrix guard, the relation of the lower ends of the partitions with the lower magazine channels may be observed by looking down from over the top of the distributor beam. There are four screws, one indicated at *20*, which regulate the up-and-down position of the lower channel entrance lower plate in relation to the lower magazine lower plate.

The lower entrance *11* is supported by two blocks, the left-hand one of which is indicated at *22*, doweled to the frame *1*. Three screws (not shown) at the back of the frame *1* fasten the entrance to the frame and the adjusting screw *23* regulates the sidewise position of the partitions with the lower magazine channels.

Adjustment of Side Magazine Channel Entrance.—On those machines equipped with the side magazine unit, an additional channel entrance is doweled and screwed to the end of the main magazine entrance frame. Similar means of adjustment to position the entrance in relation to the side magazines are provided.

Mixer Channel Entrance Partition Springs.—Thin springs or feathers affixed at one side of the Mixer channel entrance partitions extend towards the lower end of the partitions. These springs *2*, Fig. 154 (in the case of some channels) can be slightly curved out at the upper corner of the lower end as at *3*, to guide matrices into the magazine. Although all the partitions have these springs, it will not be necessary to curl the top corner of the lower ends of all the feathers. This will be necessary only where there is a possibility of thin matrices tipping sidewise and clogging the channel entrance, or in the case of wide matrices some support should be given by the feathers.

The channel entrance partitions and feathers are made of phosphor bronze and are very durable.

Chapter XXVIII

THE DISTRIBUTOR CLUTCH

The distributor is driven by a clutch which receives its driving power from a belt connected to a pulley on the intermediate shaft.

The clutch consists of a pulley, against one side of which a splined flange having a fibre clutching surface bears. The flange is urged against the pulley by a spring, set inside the hollow shank of the flange and encircling the clutch shaft. Both the pulley and the flange run on the clutch shaft, to which is also pinned the gear that drives the conveyor screws. The flange is splined, that is, it has a key set in its bearing recess which engages a slot in the clutch shaft. This causes the flange to turn with the shaft, but at the same time it is free to slide a short distance endwise upon the shaft. As long as the spring is permitted to force the washer or facing against the side of the driving pulley the distributor will be in operation.

There is a flat bar mounted at the rear of the channel entrance partition plate brackets, which is free to move endwise within close limits. This bar has saw-like teeth at its front edge, one of which engages each channel entrance partition. The bar is held in normal position by a spring fastened to the center partition plate bracket. The automatic stopping bar terminates in a hardened right-angle tip at the left (looking at it from the rear of the machine). This tip engages a hooked adjusting plate on the end of the clutch lever which is pivoted immediately below the driving pulley. The clutch lever has a screw with a cone-shaped projection mounted in the end of the extension. When the automatic stopping bar is caused to move to the left (back view) by reason of a matrix being forced against a channel entrance partition by a conveyor screw thread, the partition bears against a tooth of the automatic stopping bar, and the lug on the end slips from the hooked plate on the clutch lever. A spring then causes the lever to rock upwards and the cone screw rises in engagement with a collar on the flange. The collar has a cam-like edge and the screw engaging one of the projections upon the collar causes the flange facing to be moved out of engagement with the driving pulley. As long as the cone screw in the clutch lever holds the flange facing away from the pulley, the belt and pulley will run idle. See Fig. 156 for detailed description of the parts.

Adjustment of the Clutch Lever Adjusting Plate.—The automatic stopping bar should always be very free in its guides and never permitted to become gummy or sticky. The projection at the end of the bar should rest upon the hooked plate on the clutch lever about 1/32″. The plate is adjustable after loosening the two screws which fasten it to the lever. If the projection at the end of the automatic stopping bar rests more than 1/32″ upon the

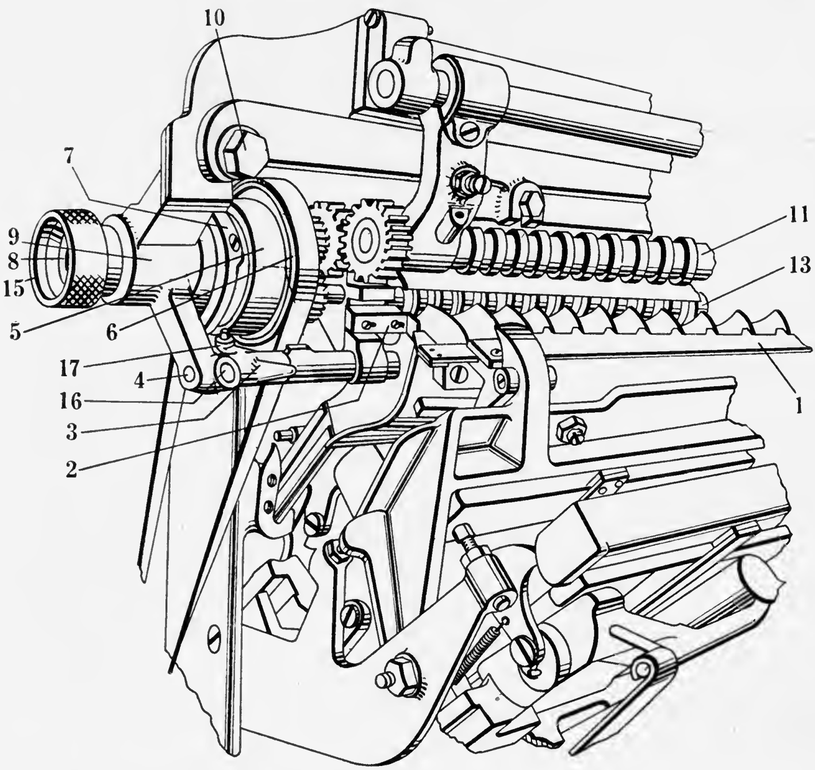


FIG. 155.—Distributor Driving Clutch which is used on all Intertype machines. Part of the channel entrance is also shown. The clutch drives the distributor screws and is provided with a means for disengagement to render it inoperative in case a matrix fails to properly clear the channel entrance partitions and the distributor screws, in dropping from the distributor combination bar.

The back distributor screw is indicated at *11*, and *13* is the lower front screw. The channel entrance has mounted in its brackets and automatic stopping bar *1*, the front edge of which is toothed, and each tooth engages a channel entrance partition. Normally, when the entrance is in closed position against the magazine, the right-angle lug on the automatic stopping bar *1* stands in engagement with a hooked plate *2* mounted upon the clutch lever *3*. The lever *3* is pivoted upon a shaft *4*. In a hole in the casting behind the clutch lever plate *2* there is a spring (not shown) which tilts the lever *3* when the stopping bar *1* is moved to the left (viewed from the back of the machine) and out of engagement with the hooked plate *2*. As the lever *3* is tilted by the spring (not shown) the tapered pawl screw *17* in the end of the extension lever *3* engages the flange collar 7 and moves the flange *5* away from the side of the clutch pulley *6*. The face of the flange *5* which bears against the pulley *6* is fitted with a heavy fibre clutching washer. As long as the channel entrance is not in open position, the tapered pawl screw *17* is held down and away from the collar 7.

Also are shown some of the gears which drive the distributor conveyor screws. The belt pulley *6* is mounted upon the clutch shaft, and pinned on this same shaft there is a gear meshing with two of those shown in this group.

clutch lever plate, the channel entrance partitions will have too great a movement before causing the bar to trip the clutch lever and stop the distributor. The channel entrance partitions, in such cases, may become bent out of shape. A partition may become slightly bent after a distributor stop and can be straightened with a pair of duckbill pliers. However, if a partition has been forced out of shape too much due to improper setting of the clutch lever plate and consequent distributor stops, it may be damaged to the extent of requiring replacement with a new partition.

In order to test the partitions for normal alignment position with the teeth of the automatic stopping bar, open the entrance and slightly shake the bar back and forth. There should be no movement of any partition when the bar spring returns the bar to normal position. If any of the partitions do

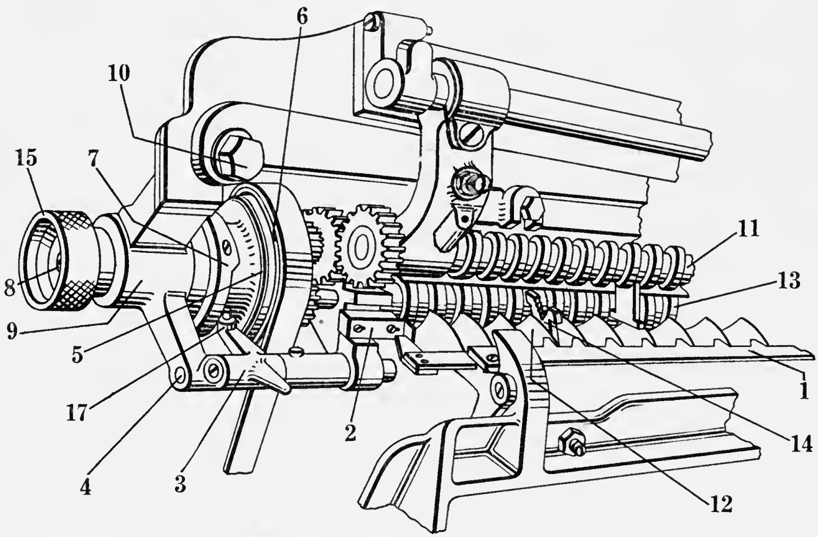


FIG. 156.—Rear View of the Distributor Clutch, functioning to stop the distributor by means of the matrix *14*, which has not cleared the lower distributor screw. A thread of the lower distributor screw *13* bears against the upper front lug or ear of the matrix *14*, moving the channel entrance partition *12*, which in turn causes the stopping bar *1* to be disengaged from the clutch lever plate *2*. A spring (not shown) in the beam casting behind the adjustable clutch lever plate *2* then moves the lever *3* so the cone-shaped screw *17* engages the clutch flange collar *7*, retracting the fibre facing of the flange *5* from the revolving pulley *6*.

As soon as the channel entrance has been opened to clear away the matrix causing the distributor to stop, a spring will pull the automatic stopping bar to its original position with its saw-like teeth resting against the channel entrance partitions, and when the channel entrance is again closed the lug on the bar will engage the hooked end of the plate *2* on the clutch lever *3*, disengaging the cone-shaped screw *17* from the flange collar *7*. As soon as the flange collar *7* is released, a spring (not shown) within the shank of the flange *5* will move the fibre clutching washer on the flange in engagement with the side of the driving pulley *6* and the distributor will again be free to operate.

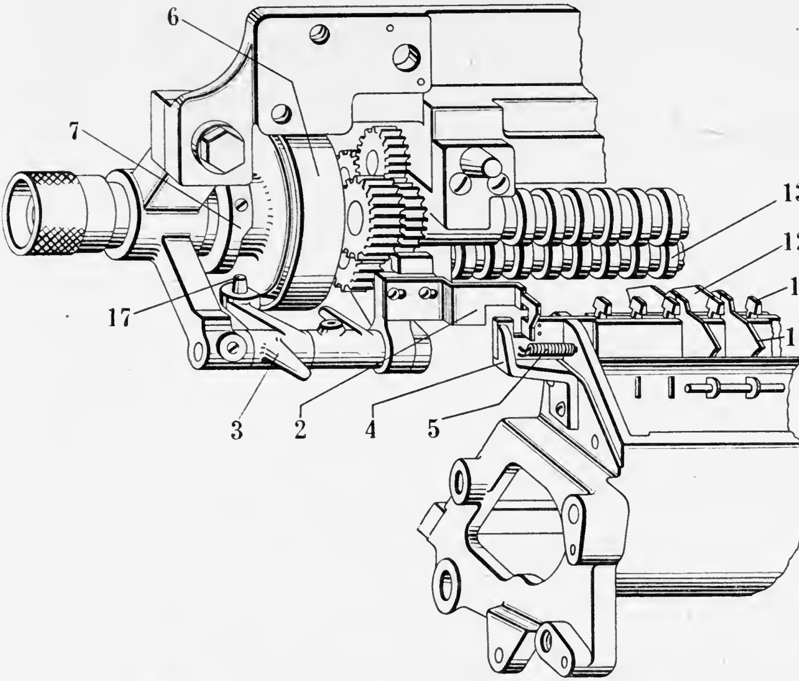


FIG. 157.—The Mixer Channel Entrance and Clutch Mechanism. The distributor stopping device is similar to that used on the single distributor Intertypes, but some of the parts are made in slightly different form.

When a matrix does not fall just right from the distributor combination bar, a screw thread in the lower front conveyor screw *13* engages its upper front lug and causes a partition *12* to be moved to the left (back view). In moving to the left, the partition *12* bears against one of the lugs on the upper edge of the automatic stopping bar *1*, causing the lug on the extreme end of the bar to be thrown out of engagement with the hooked end of the plate *2* on the clutch lever *3*. A spring behind the lever under the adjusting plate 2 (not shown) causes the clutch pawl screw *17*, to be raised into engagement with the cam-like flange collar 7. The action of the screw *17* engaging the flange collar 7 retracts the heavy fibre facing from the side of the clutch pulley *6*. When the channel entrance frame is opened, the spring *5* returns the automatic stopping bar *1* to normal position with its lugs resting against the upper parts of the channel entrance partitions, *12* and *15*, so that after the matrix causing the stop has been cleared away and the channel entrance is closed, the lug on the rod *1* will depress the plate *2*, throwing the stopping screw *17* down and out of engagement with the flange collar 7. This releases the flange and the clutch spring (not shown) within the shank of the flange, moves the fibre facing against the side of the clutch pulley *6*, causing the distributor to go into action again.

have a movement when the bar is shaken, they should be straightened with the duckbill pliers. Once in a while, go over the partitions with the pliers to keep them in good shape and proper alignment, so that unnecessary distributor stops will not occur.

Clutch Lever Pawl Screw Adjustment.—In the end of the clutch lever, the screw which engages the flange collar and stops the distributor, has a tapered end, and while the distributor is running normally there should be about 1/16″ between the end of the screw and the revolving flange collar. The screw is adjustable and a hexagon nut underneath the lever holds the setting after it has been made.

Removing the Distributor Clutch

If it becomes necessary to remove the clutch from the distributor, for repairs or cleaning, proceed as follows:

Open the channel entrance, loosen the screw holding the clutch lever shaft *4*, Fig. 155, slip out the shaft, and the lever *3* can be removed. Remove the clutch flange knob *15*, take out the hexagon head screw *10* which fastens the clutch bracket *9* to the beam. In order to disengage the bracket *9* from its dowels, it may be necessary to spring the top part from the beam with a small screwdriver, after which it can be taken from the flange shank. Remove the screw *8* in the end of the clutch shaft and take out the spring washer and spring; the flange and pulley can now be slid from the shaft. In order to remove the shaft, there is a pilot screw in the front distributor screw bearing, projecting into a groove in the end of the shaft which must first be taken out. See Fig. 146 for replacement of the driving shaft and timing the gears.

Like any other part of the machine, an excess amount of oil will be detrimental to good operation of the clutch.

Distributor Clutch Pulley Lubrication.—In the face of the distributor clutch pulley *6*, Fig. 156, under the belt, there is a headless 8-32 screw which is used to plug an oil hole for the pulley. The pulley needs no lubrication except during the time a distributor is stopped when it will revolve upon the clutch shaft. While the distributor is in operation, the clutch shaft turns with the pulley. It is well to put a drop of oil in the oil hole of the pulley on oiling day, after removing the screw plug. Replace the screw afterwards to prevent the oil running out of the hole.

Chapter XXIX

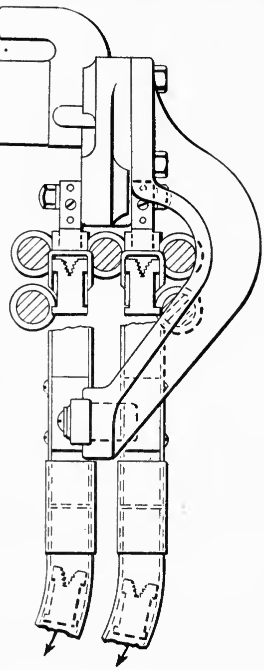
THE PI STACKER

In all sets of matrices there are certain little used characters, such as the "æ" and "œ" ligatures, fractions and references symbols like the single dagger, section mark, etc., for which there are no channels in the magazine. These characters have full combination teeth and traverse the full length of the distributor combination bar until they come to the extreme right end, where they drop off into a pi chute near the distributor driving clutch. The lower end of the chute connects with what is called a pi stacker at the right of the keyboard and placed conveniently for the operator's use in lifting out the matrices wanted, which are inserted in the assembling elevator by hand.

There are several forms of pi stacker according to the range and versatility of the magazines regularly applied to the machine.

The one illustrated in Fig. 158 is applied to the Intertype Mixer and has a star wheel running under power for each stacker. Pi matrices for the upper and lower magazines are returned by the distributor to the proper stacker in the order in which they were inserted in the matrix line by hand.

No special attention need be given the automatic pi stacker except to keep it clean and dry. Avoid an excess of oil in the star wheel bearings which might flow over the parts and foul the matrices.



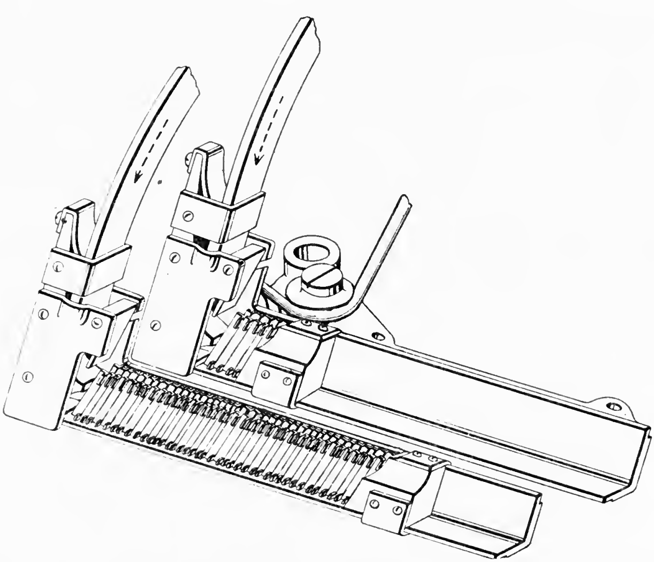


FIG. 158.—View of the Pi Stackers used on the Mixer machine, and the pi chutes leading from the ends of the distributor bars into the pi stackers.

Chapter XXX

THE DRIVING MECHANISM

The main cams actuate the major portion of the various parts making up the casting mechanism of the machine. The cams are caused to revolve by a friction clutch which is connected to the cams through a short shaft and pinion mounted on the machine base underneath the main cams.

The pinion meshes with the large driving gear and mold cam which is fastened upon the cam shaft with the other main cams.

The clutch shaft and pinion revolve eleven times to every revolution of the main cam shaft.

The driving shaft extends outwardly from a bearing at the right of the machine frame and is hollow. Within the hollowed-out shaft is a small rod called the clutch rod, passing through a coil spring. Upon the outside end of the shaft is a clutch arm, and the clutch rod is connected by links to shoe pieces faced with leather buffers which engage the inside rim of the driving pulley when the clutch is in action. This forms a toggle arrangement.

The clutch rod spring inside the hollow portion of the shaft bears against a bushing in the end of the shaft and against a collar pinned near the other end of the clutch rod. The coil spring constantly exerts a pressure upon the clutch rod to move it inwardly when permitted, Fig. 159-A, in order to expand the leather buffers against the inner rim of the clutch pulley.

At the inside of the driving shaft bearing, a flange fits over a slot cut lengthwise through the shaft, and at this point a long screw passes through the flange and the slot in the shaft into a hole in the end of the clutch rod. The slot permits a short lengthwise movement of the flange upon the clutch shaft which also causes the clutch rod within the shaft to move when the flange is moved, and through the links in the clutch arm the leather buffers are retracted from or are permitted to clutch the inner rim of the pulley by force of the spring.

In the delivery and elevator transfer cam, which is on the same shaft as the other main cams, are fastened at different positions the automatic stopping and safety pawls. These pawls project outwardly from the rim of the cam. If the cams upon the cam shaft are about to stop at normal position, the automatic stopping pawl bears down upon an upper stopping lever, causing the lower stopping lever to move a large L-shaped lever, called the forked lever. The forked part of this lever straddles the flange upon the driving shaft and moves it outwardly, overcoming the resistance offered by the clutch rod spring. The rod inside the driving shaft, being fastened by a long screw to the flange mounted upon the outside of the driving shaft, moves the clutch arm links, and the leather buffers mounted upon the shoes are pulled away

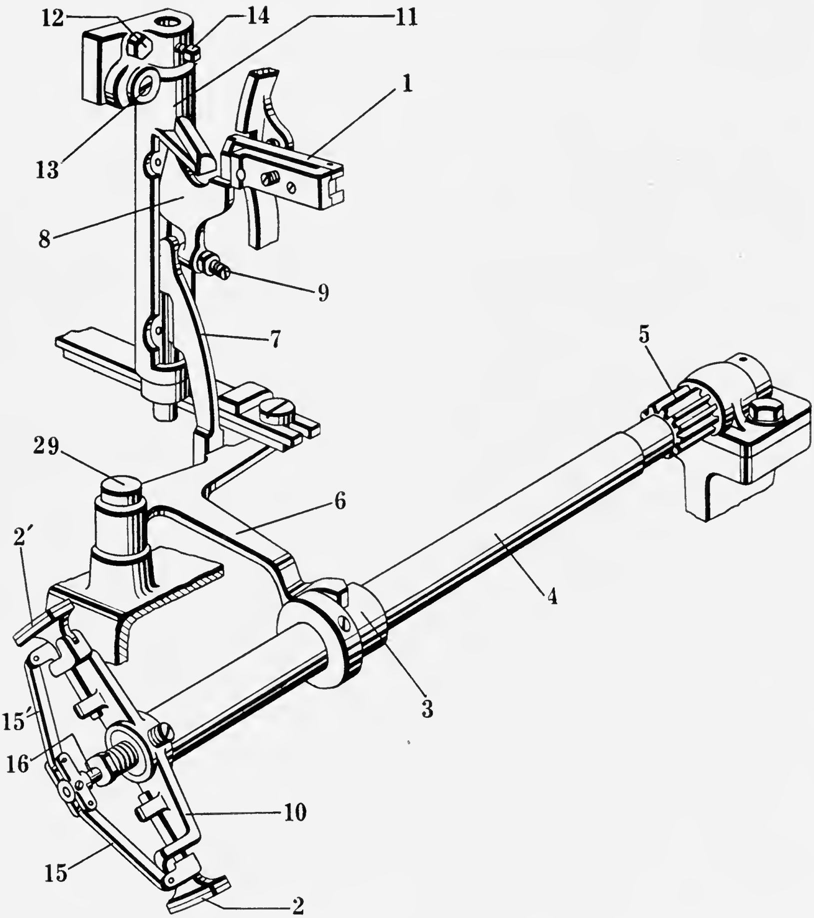


FIG. 159.—How the Clutch Goes Into Action. When the assembling elevator is raised by the operator, the delivery slide conveys the matrix line to the first elevator. Just as the delivery slide reaches its extreme left stroke, a roller on the cam roller arm fastened to the delivery slide lever shaft, strikes a plate on the automatic stopping pawl *1*, and pushes the pawl from the upper stopping lever *8*; this action releases the pressure from the forked lever *6* pivoted at *29*, through the lower stopping lever *7*. The pressure of the forked lever *6* being released from the flange *3*, connected to the clutch rod *16* within the hollow driving shaft *4*, permits the clutch rod spring to push the rod inwardly, and the links *15* and *15′* expand both shoes faced with the leather buffers *2* and *2′* against the inner rim of the revolving clutch pulley.

from the inner rim of the revolving pulley, whereupon the machine comes to a stop.

The Machine in Action.—While the leather buffers are gripping the inside rim of the driving pulley, and the starting and stopping lever is open, the machine is always spoken of as being *in action.*

The Machine in Normal Position.—When the automatic stopping pawl, extending out from the rim of the delivery and elevator transfer cam is bearing upon the upper stopping lever, so that the leather buffers cannot grip the driving pulley, the machine is spoken of as standing *in normal position.*

The Machine in Casting Position.—While the first-elevator head is resting upon the vise cap and the metal pot is locked against the mold, the machine is *in casting position.*

The Machine at Transfer Position.—While the automatic safety pawl bears down upon the upper stopping lever, and the starting and stopping lever is either open or closed, the machine is said to be *at transfer position.*

In speaking of any other position of the main cams, or the principal parts of the casting mechanism, a comparison is made with one of the above described positions in order to identify the possible cause of any trouble that might arise to stop the machine.

The purpose in applying a clutch of the friction type to the Intertype is to make possible a slippage of the clutch in case some abnormal interference binds the machine. In this way broken or damaged parts are avoided.

Due to a number of causes, the clutch may fail to pull the machine around its cycle of normal operating stresses.

Machine Stresses.—The greatest stresses the clutch must overcome are those which occur when the metal pot is being locked against the mold under pressure of the pot cam through the pot lever spring, and also when the pot pump plunger is being raised to normal position after the cast against the tension of the pump lever spring. The justification lever springs also set up a resistance against the power exerted by the clutch spring, and when the ejector blade first strikes the base of the slug in ejecting it from the mold the clutch spring must have sufficient tension to carry the machine steadily along.

Abnormal Interferences.—Some of the abnormal interferences that may be mentioned are: (1) Foul pot pump plunger and crucible well; (2) A front or back squirt; (3) Screw working loose in the mechanism; (4) Failure of the mold disk locking studs to register properly with the stud blocks in the vise frame; (5) The right-hand knife in the knife block has not been reset when the size of the slug has been changed, and (6) The ejector blade has not been reset when changing from a long to short measure mold.

Keep the Driving Pulley Inner Rim Clean.—The inner rim of the driving pulley should be cleaned regularly with gasoline to remove all grease or oil which might cause the leather buffers to slip while the machine is in action.

The clutch arm shoe leather buffers which engage the inner rim of the driving pulley must also be kept clean.

Some machinists and operators have been known to apply rosin, printers' ink, glue or other dope to the leather buffers in order to make the clutch pull the machine around, but this is a bad practice.

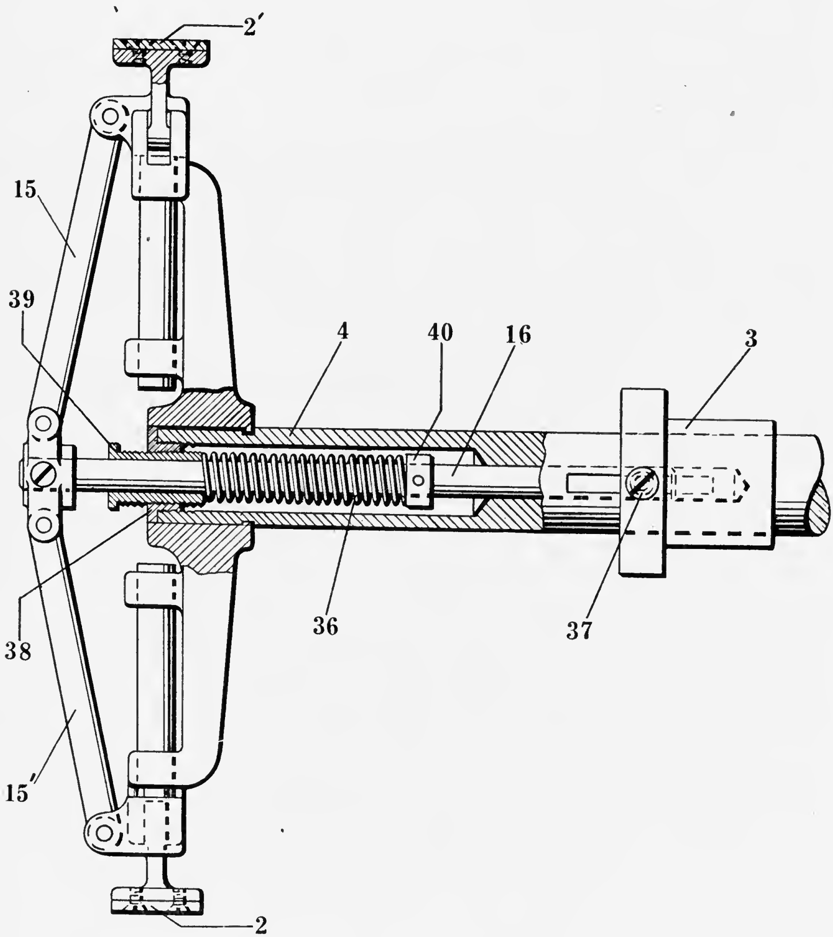


FIG. 159a.—At *4* is indicated the clutch shaft upon which the flange *3* is mounted, *2* and *2′* are the leather buffers; *16* is the clutch rod, which is connected to the flange *3* by the screw *37*; the spring *36* bears against the collar *40* upon the rod *16* and through its pressure causes the rod to expand the buffers *2* and *2′* against the inner rim of the driving pulley. The nut *39* forms a bearing for the spring *36*. This nut can be turned in to increase the tension of the spring when it does not have strength enough to drive the machine through all its stresses.

As the leather buffers are cleaned from time to time, they will become thinner. Naturally, the leathers becoming thinner, the 15/32″ adjustment between the clutch shaft bearing and flange will grow wider, until the flange binds against the forked lever, and the clutch will not pull the machine properly because the buffers will be held away from the clutch pulley. The forked lever adjustment must not be altered in a case like this. The leather buffers should preferably be replaced or can be underlaid with thin cardboard to restore the 15/32″ adjustment between the clutch shaft bearing and flange. Packing the leathers will automatically restore the 1/32″ space between the flange and forked lever when the machine is in action.

Testing the Clutch Adjustments.—In order to test the condition of the clutch adjustments, back the machine until the automatic stopping pawl is clear of the upper stopping lever. Open the starting and stopping lever and the machine will be in a position equivalent to that while running under power. Insert the gauge, 15/32″ wide (made from thin steel or brass rule), between the clutch shaft bearing and flange. When the leather buffers have been properly underlaid, the gauge will fit the space between the bearing and flange fairly well.

The leather buffers should be of equal thickness. Occasionally, remove the clutch arm from the machine and roughen the buffers with coarse flint paper or a rasp, or scrape them with a knife blade.

The clutch spring which causes the leather buffers to grip the inside rim of the driving pulley normally exerts a pressure of about 20 pounds. The spring will do its work over a long period of time before needing to be stretched or replaced, whichever the case may be. When the spring is first applied, it is about 4½″ in length. There is an adjusting nut screwed into the large nut at the end of the clutch shaft which can be turned to increase the tension of the spring, should the machine hesitate because of weak clutch spring tension. If screwing up the tension adjusting nut does not give relief and the clutch adjustments are in good condition, the spring can be taken out for stretching by removing the clutch arm and unscrewing the nut upon the outside end of the clutch driving shaft. The spring should be stretched so that its length will not exceed 5½″. Usually, one-half inch additional length will be sufficient.

Before stretching a clutch spring, be certain that all adjustments are in good order and that all bearings are properly lubricated. Stretching the spring too much will defeat one of the functions of the clutch—that of slipping when an abnormal interference, such as a back squirt, occurs.

Worn Driving Pinion

The machine is driven by the small pinion *5*, Fig. 162, upon the end of the clutch shaft *4*. After several years, the pinion teeth wear thin, and the cams revolve with a series of thumps, caused by the backlash between the worn teeth of the pinion meshing with the large driving gear teeth.

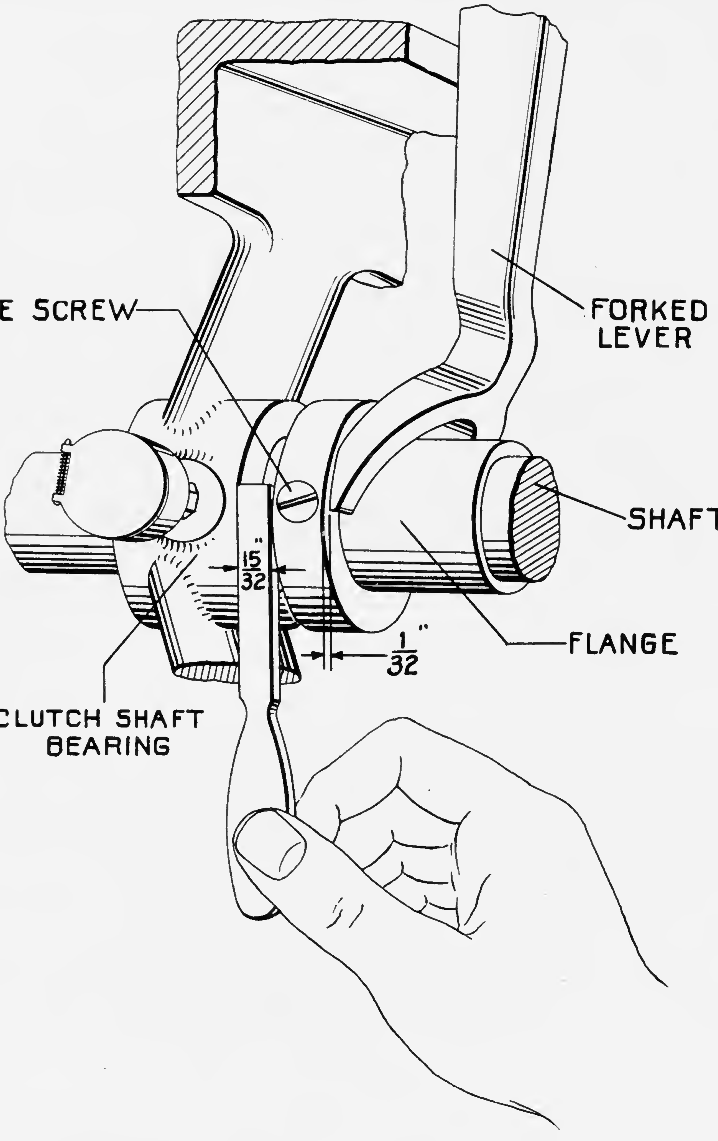


FIG. 160.—Application and Use of a Simple Gauge, 15/32″ wide and about 1/32″ thick to determine whether the space between the clutch shaft bearing and flange is correct when the machine is in action. The 15/32″ space is obtained by underlaying the clutch arm leather buffers with thin cardboard. While the gauge is in the position shown, there should be 1/32″ play between the flange and forked lever, which is obtained by adjusting a screw in the upper stopping lever.

It is not a difficult matter to apply a new pinion to the clutch shaft. Remove the clutch arm, turn out the nut in the end of the clutch shaft and withdraw the spring; take out the screw from the flange and remove the clutch rod. Drive out the taper pin holding the collar to the small driving pinion, as well as the taper pin fastening the pinion to the shaft.

If the shaft and pinion have become frozen, it may be necessary to heat them where they join with a torch and drive the shaft from the pinion while hot.

Clutch Troubles

If the machine stops with a chattering noise, the gripping surfaces of the clutch arm leather buffers may be sticky and force the automatic stopping pawl to depress the upper and lower stopping levers against the vertical shaft before the leathers are released from the inside rim of the driving pulley.

If the cams rebound slightly upon stopping at normal position, it is an indication that all bearings and cam rollers are properly lubricated; that the clutch buffers are clean and the clutch is in proper adjustment, although the rebound of the cams will not occur on all machines that are in good condition.

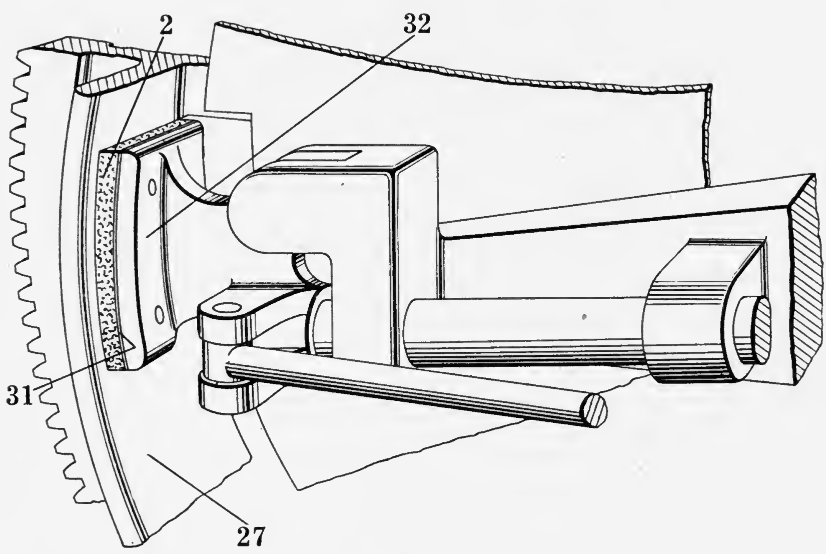


FIG. 161.—Section of Clutch Arm Mechanism. The rim of the driving pulley is represented at *27*; *32* is the clutch arm shoe; *2* is the leather buffer fastened to the shoe by four brass screws; the paper *31* is put under each leather buffer to build it up when necessary in order to maintain the 15/32″ adjustment between the forked lever and the clutch driving shaft bearing when the machine is in action.

If the machine starts with a loud noise, there may be a dry bearing or cam roller in the machine which drags on the cams when the machine stops, and prevents the clutch releasing as soon as the upper stopping lever is moved to release the clutch.

If the space between the clutch shaft bearing and the forked lever is too wide, the clutch cannot be released soon enough to stop the machine smoothly.

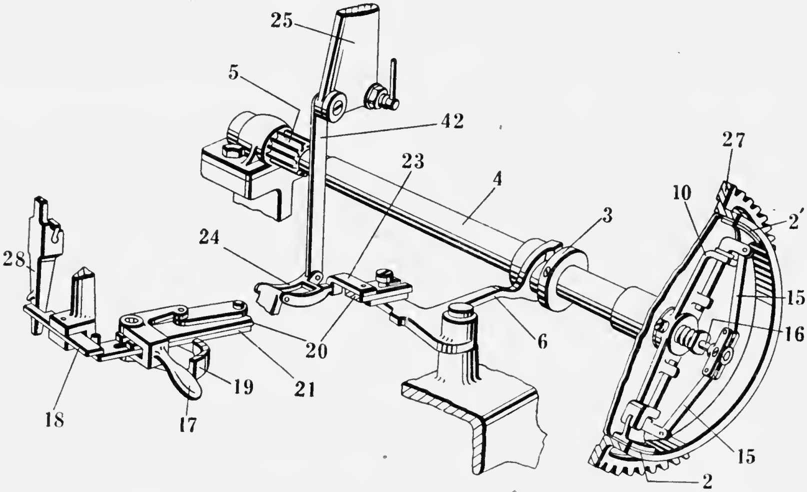


FIG. 162.—Controlling Mechanism. In the controlling mechanism now applied to Intertypes there are two connecting rods, *20* and *21*. The rod *20* forms a means of connecting the starting and stopping lever *17* with the forked lever *6* to shut off the machine manually when desired. The rod *21* connects the vise automatic with the forked lever *6* and shuts off the machine when the first elevator fails to be seated properly upon the vise cap.

It has been previously explained that when the vise automatic functions, the mold strikes a dog or plunger in the vise frame which pushes against the stop rod *28*, and the stop rod lever *18* swings through a small arc of a circle against a lug in the front end of the lower connecting rod *21*. The rod *21* then moves the forked lever *6* against the flange *3* which is fastened inside the hollow end of the clutch shaft *4* to the clutch rod *16*, causing the links *15* and *15'* to move the leather buffers *2* and *2'* from the inside rim of the clutch pulley *27* and the machine comes to a stop.

The stopping of the machine manually by the starting and stopping lever *17* is accomplished in the same manner as the stopping of the machine through the vise automatic when the connecting rod *20* in the bracket *19* moves the forked lever against the flange *3*.

It is customary to shut off the starting and stopping lever before depressing the mold cam lever handle when the mold slide is to be withdrawn for cleaning purposes. Once in a while, the one doing the repair work will forget to raise the mold cam lever handle. On the Intertype, the starting and stopping lever *17* cannot be opened to start the machine unless the mold cam lever handle has been raised. There is a lock *24* pivoted on a bracket fastened to a screw in the machine column which is connected to the mold cam lever *25* by a link *42*. When the mold cam lever is disengaged from the mold slide, the link *42* raises the locking piece *24* in front of the lock block *23* upon the connecting rod *20*.

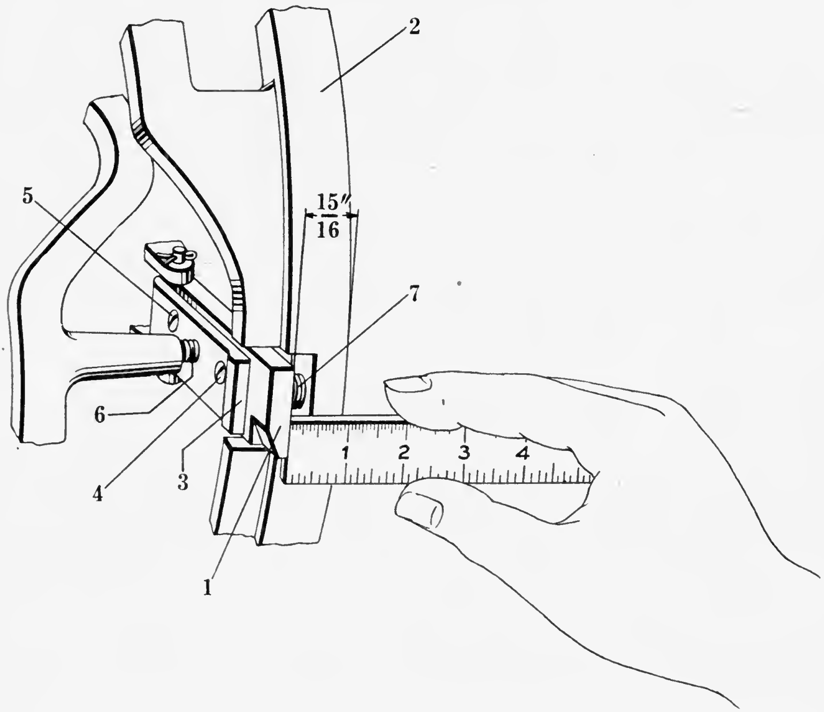


FIG. 163.—Back View of the Automatic Stopping Pawl, and a section of the delivery and elevator transfer cam (cam No. 10) at *2*. The automatic stopping pawl *1* is adjusted for position by the screw *6* until the right side of the pawl (standing back of the machine) is 15/16″ from the right side of the cam rim.

The pawl is caused to bank by its adjusting screw *6*, against a lug of the cam under pressure of the pawl spring *7*.

The plate *3* on the automatic stopping pawl *1* is adjustable after loosening the binding screw *5* by turning screw *4* until the roller on the delivery slide cam roller arm pushes the stopping pawl clear of the upper stopping lever 1/64″. After turning the adjusting screw *4*, tighten the binding screw *5*. Before adjusting the plate, check the 15/16″ adjustment given above and see that the pawl (when the machine stands at normal) is resting ¼″ upon the upper stopping lever *8*, Fig. 165.

If the clutch flange bears against the forked lever because the leather buffers are too thin, the machine will hesitate after the cast when the pump plunger should rise from the pot crucible well, and possibly at ejecting position. A weak clutch spring will give the same effect.

Greasy clutch buffers will cause the clutch to slip.

The clutch rod spring should not have too much tension. Its purpose in permitting the clutch to slip in case of accident will be defeated if the tension is increased too much by stretching the spring.

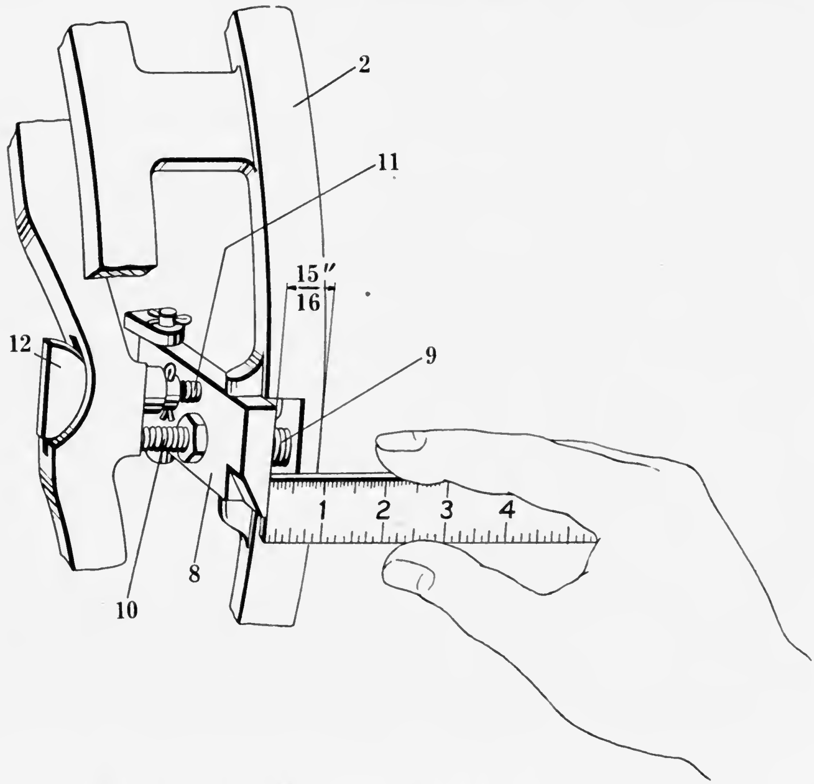


FIG. 164.—Back View of the Automatic Safety Pawl and a section of the delivery and elevator transfer cam *2* (cam No. 10). The automatic safety pawl *8* causes the machine to come to a stop at transfer position by striking the upper stopping lever and throwing the clutch out of action when the second elevator is held up by a clogged distributor. The same action will take place if the spaceband transfer lever pawl is latched while recasting, or in case the first elevator does not come up fully to transfer position. This safety pawl *8*, like the automatic stopping pawl *1*, Fig. 163, in the same cam, is adjusted by screw *10* (this figure) until the right side of the pawl is 15/16″ away from the right side of the rim of the cam (back view looking toward the front of the machine).

As the transfer lever shifts the matrix line from the first to the second elevator, its stroke is limited when the roller on the transfer lever cam roller arm strikes the plunger *12*, causing the safety pawl to be moved to the right (back view) and clear of the upper stopping lever. The automatic safety pawl banks against the rim of the delivery and transfer cam *2*, as the roller pushes it clear of the upper stopping lever. There is a screw *11* in the automatic safety pawl *8*, against which the plunger strikes, which should be adjusted so that the right side of the transfer finger will be even with the left-hand end of the second-elevator bar plate when the transfer finger has completed its first stroke. Correct adjustment of the screw *11* will insure the last matrix in a 30-em line being fully transferred from the first-elevator jaws to the second-elevator bar. If the screw is turned out too far against the plunger *12*, the

transfer finger will not be permitted to push the last matrix from the ends of the first-elevator jaws, and an excessive strain will be imposed upon both the jaws and the second-elevator lever as it starts to raise the matrices up to the distributor.

Never use belt dressing, rosin, printers' ink or any other dope upon the leather clutch buffers.

If the clutch flange is dry and sticks upon the clutch shaft, the machine may not start when the delivery slide is sent over.

The Motor

Most Intertypes are driven by geared motors mounted upon a special bracket furnished with the machine. This bracket *4*, Fig. 166, is supported by two large screws at the right of the machine column just back of the keyboard.

The motor bracket is so arranged that its fastening screws can be loosened and the bracket swung out to make the motor accessible for repairs or cleaning. The rear bracket fastening screw hole is cut away to permit the motor to swing out upon the bracket.

A screw *3* inside the bracket, is adjustable to bear against the machine base to limit the inward position of the bracket so the motor pinion will not need to be reset upon returning the bracket to place after swinging it out for repairs.

The motor bearings should be oiled at regular intervals and the oil rings which lubricate the armature shaft should always show the presence of oil from the reservoirs under the shafts when the motor is in operation. It is not necessary to overflow the oilers. Application of fresh oil every two weeks should be sufficient unless the oil has leaked out because of a damaged oiler or reservoir plug.

Give some attention to the commutator weekly and polish it with fine sandpaper. See that the brushes are free in the brush holders, and that the brush springs hold the brushes properly against the commutator.

Twice a year or oftener, if necessary, depending upon the cleanliness of the surroundings, remove the motor to drain and clean the oil reservoirs. In time, a muddy deposit may be built up high enough to prevent the oil rings turning upon the armature shaft.

An extra motor pinion for a one-machine plant should always be kept on hand for emergency application. Much loss of time will be averted by keeping extra pinions on hand where two or more machines are in use.

Applying a New Pinion.—When getting ready to apply a new pinion, the screws *1* and *2*, Fig. 166, are loosened and the bracket *4* swung out. The pinion is held on the armature shaft by a toothed washer and left-hand nut. There is a hole drilled in the armature shaft near the pinion, through which

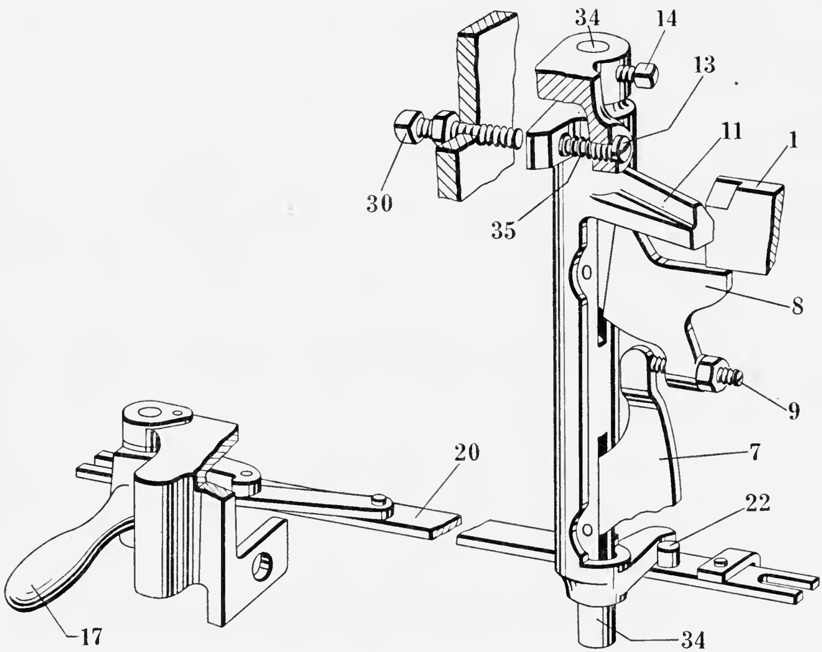


FIG. 165.—Perspective View of the Vertical Starting Lever *11* and the automatic stopping levers *7* and *8*; the function of the vertical starting lever *11* is to push the automatic stopping and safety pawls *1* from the upper stopping lever *8* when the operator pulls the starting and stopping lever *17* by hand to start the machine in motion, and functions only when the starting and stopping lever *17* is operated by hand.

The vertical starting lever bracket is cut away to show the adjusting screws which regulate the two positions of the vertical starting lever *11*. Screw *30* inside the machine column projects through the column casting and determines the normal position of the vertical starting lever *11*. The screw *30* should be set so that when the automatic stopping and safety pawls are about to engage the upper stopping lever *8* there will be a space of 1/64″ between the upper lug of the lever *11* and the pawl *1* in cam No. 10. This adjustment must not be made unless the 15/16″ adjustment of the pawls from the edge of cam No. 10 is correct.

The spring *35* returns the vertical starting lever *11* to normal position when the starting and stopping lever *17* at the front of the machine is released.

When the starting and stopping lever *17* is operated by hand to start the machine, the connecting rod *20* causes the stud *22* to engage the lower lug of the vertical starting lever *11*, so that its upper lug will push the automatic stopping and safety pawls *1* clear of the upper stopping lever 1/64″.

When the handle *17* is pulled outwardly by hand to set the machine in motion, the upper lug *11* of the vertical starting lever banks against the pilot of the headless adjusting screw *13* which is adjusted to limit the stroke of the upper lug to push either the automatic stopping or safety pawl *1* about 1/64″

from the upper stopping lever *8*. The screw *14* is loosened to permit adjustment of the upper stopping lever *8* sidewise by turning the shaft *34*, so the stopping and safety pawls *1* will rest upon it ¼″.

The screw *9* in the lower edge of the upper stopping lever *8* is adjustable to obtain the 1/32″ space between the forked lever and flange when the machine is in action.

a piece of rod or a screwdriver can be passed to hold the shaft while loosening the left-hand threaded pinion nut.

After the new pinion has been applied, the bracket stop screw *3*, striking against the machine base, will position the pinion just right in relation to the large driving gear, after the fastening screws *1* and *2* have been tightened.

In case the motor has been removed from its bracket, the pinion can be set in proper mesh with the large gear while tightening the four screws holding the motor to the bracket. After the pinion has been set in proper mesh with the driving gear, there should only be a slight humming noise. If the pinion is set too closely, the noise will be objectionable and the pinion should be reset to avoid damage to the pinion teeth.

Micarta motor pinions having different numbers of teeth can be furnished upon order where the customer desires to change the speed of the machine, although the Intertype Corporation recommends that all motors be fitted with pinions which will cause the machine to cast from six and one-half to seven lines per minute. When the machine is operated at this speed the best productive results are obtained.

Proper Speed of Machine.—If the machine is operated in excess of six and one-half to seven lines per minute, it may be necessary to slow down the speed of the keyboard rubber rolls, which should revolve not to exceed 290 revolutions per minute, for the reason that the magazine escapement points will rise and fall too rapidly to permit matrices to pass over them regularly. In some cases, it may also be necessary to slow the speed of the distributor conveyor screws.

After a long period of use, the bushing in the large clutch pulley driving gear will become worn and permit the gear to sag down out of a true circle. The motor pinion will then make an irregular humming noise. A new bushing inserted in the gear will cause it to run true again and eliminate the noise. To determine whether or not the bushing is worn, grasp the gear at the top and bottom and see if it can be moved by hand upon the clutch shaft.

Source of Power Must Be Constant.—Some machines are driven by a flat belt instead of a motor and it is essential that the source of power be steady. If the power is uneven or the driving belt slips, the machine will operate jerkily, causing transpositions, and the distributor will stop frequently. When the machine runs unevenly it is well to learn to distinguish between a slipping drive belt and a slipping friction clutch. The former will cause the main cams, the assembler and distributor to slow up, while the latter will only cause the main cams to hesitate, especially after the cast.

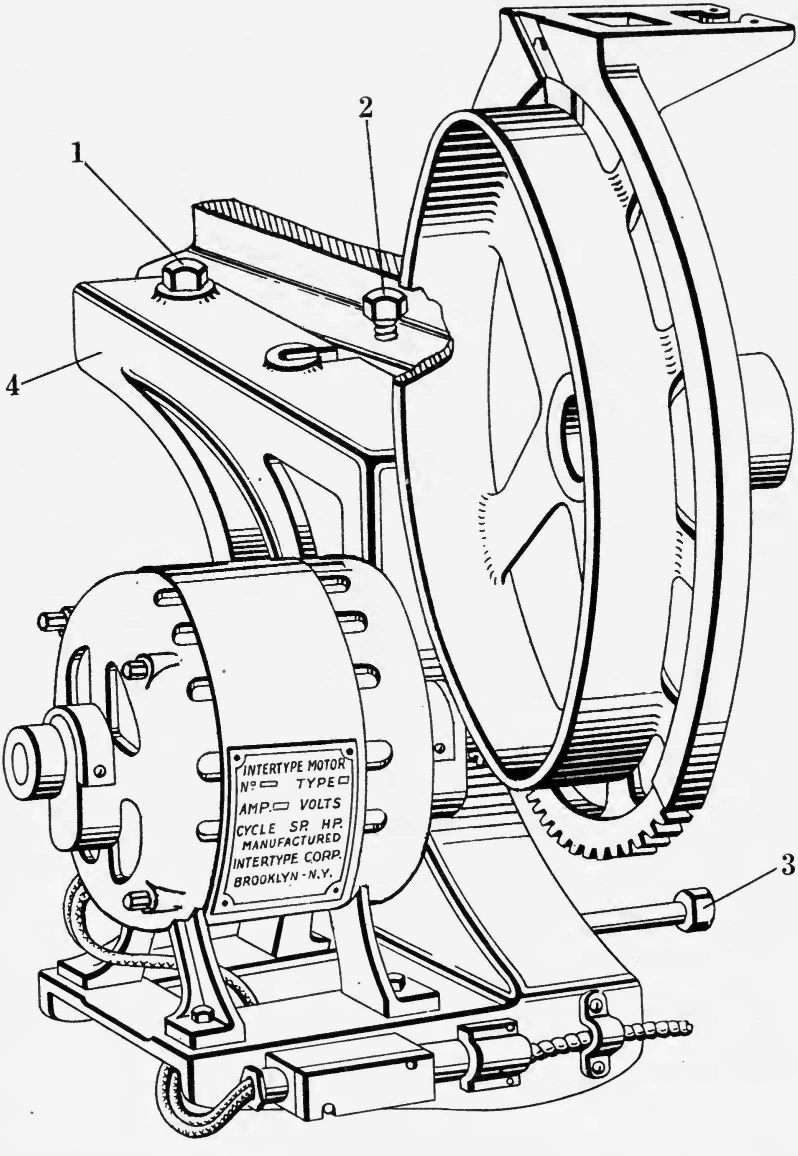


FIG. 166.—An Intertype Pinion-Drive Motor, showing method of mounting it upon a bracket attached to the machine base.

Motor Information

Motors for 110 and 220 volts, direct current, and 110 and 220 volts, alternating current (single phase, 60 cycle) are carried in stock. Alternating current motors which are special as to phase, cycles or voltage, are not carried in stock. Price information for such motors will be furnished upon request. Single phase motors can be used on two and three phase circuits.

It is not wise to attempt to use a 220-volt motor on a circuit carrying 250 volts. Two hundred and fifty volt motors are made up special.

Daily Power Consumption

Intertype standard motors are rated as follows:

220 Volts A. C., 2.9 Amperes; D. C., 1.6 Amperes.

110 Volts A. C., 5.8 Amperes; D. C., 3.26 Amperes.

All electrical power is measured in kilowatt hours.

Volts $\times$ amperes $=$ watts.

1000 watts $=$ 1 kilowatt.

Example: 110 volts $\times$ 3.26 amperes $=$ 358 watts.

Power Notes

Source of Power.—Machines may be driven from any existing shaft having a uniform speed of rotation or from an electric motor, gas engine, or water motor. Each machine requires one-third horse power.

Uniform Speed Important.—The speed of the main driving pulley should be about 68 revolutions per minute. Fluctuation in the speed will interfere with the operation and reduce the output.

Size of Pulley.—To ascertain the size of pulley required on the driving shaft, multiply the diameter of the main driving pulley on the Intertype, which is 14½″, by the number of revolutions desired (usually 66 to 68 revolutions per minute) and divide the product by the revolutions of the driving shaft. The quotient will be the diameter of the pulley required.

Chapter XXXI

THE BASE AND MAIN CAMS

The Intertype machine is built upon a low base which weighs approximately 400 pounds and is designed to eliminate vibration. At the right on the base is mounted the column which carries the distributor bracket and other main frame castings, including the pot pump bracket.

The main cams are carried upon a large cam shaft which is supported by two heavy brackets at the rear of the machine base. All of the large operating levers are controlled through the movements of the main cams, over the contours of which the lever rollers travel to transmit the various motions to the levers. The lever cam rollers are of suitable high grade steel. Some of the cam surfaces are reinforced with hardened steel shoes at points of heavy pressure to resist wear.

There are ten main cams upon the cam shaft, and these are described below in order from the right, standing at the back of the machine. With the exception of the first-elevator cam (No. 1) and the delivery and elevator transfer cam (No. 10), they are bolted together with ⅝″ bolts. Some of the cams are keyed to the shaft and others are slipped over one another at the bearings.

Cam No. 1.—First-Elevator Cam, shown at *2*, Fig. 170. This cam permits the first elevator to descend from normal to casting position, raises it slightly through compression of the spring in the first-elevator slide link, raises it to transfer position where the matrix line is moved into the transfer channel, and then permits the elevator to descend again to normal position.

Cam No. 2.—Distributor Shifter Cam, shown at *11*, Fig. 124, operates the distributor shifter outwardly as the second elevator bearing the matrix line comes to position at the distributor box. The cam then permits the shifter to push the matrices from the second-elevator bar into the distributor box. The distributor shifter cam rider is not fitted with a cam roller because there is not much of a throw in its movement.

Cam No. 3.—Mold Turning Cam, Fig. 168, which determines the turn of the mold in the mold disk from normal to casting and from there to ejecting positions. There are two toothed segments upon this cam. The short segment turns the mold through a quarter revolution of the disk from normal to casting position, and the long segment turns the mold disk through three-quarters of a revolution from casting to ejecting position. The mold turning cam is cast together with the vise closing cam.

Cam No. 4.—Vise Closing Cam, Fig. 168, has two functions. One of these functions is to close in the left vise jaw slightly at the time of justification through the vise closing mechanism and open it after the slug is cast, so the

justified matrix line can be lifted without friction from the vise jaws. The other function is to assist in driving the spaceband wedges upward to justify the matrix line tightly between the vise jaws before a slug is cast. This is sometimes called the second justification.

Cam No. 5.—The Justification Cam, shown at 5, Fig. 167, operates the first justification lever, which in turn actuates the pump stop. This cam is cast together with the second-elevator cam. As the cam revolves, the justification lever is actuated by a powerful spring mounted in a bracket underneath the lever.

Cam No. 6.—The Second-Elevator Cam, shown at 5, Fig. 117, permits the second elevator to be lowered to transfer position where it receives the matrices from the first elevator. The cam then raises the elevator to normal position at the distributor. The second-elevator cam is the largest of the group.

Cam No. 7.—The Pot Pump Cam, shown at 7, Fig. 169, operates the down stroke of the pot pump plunger which forces metal into the mold and then

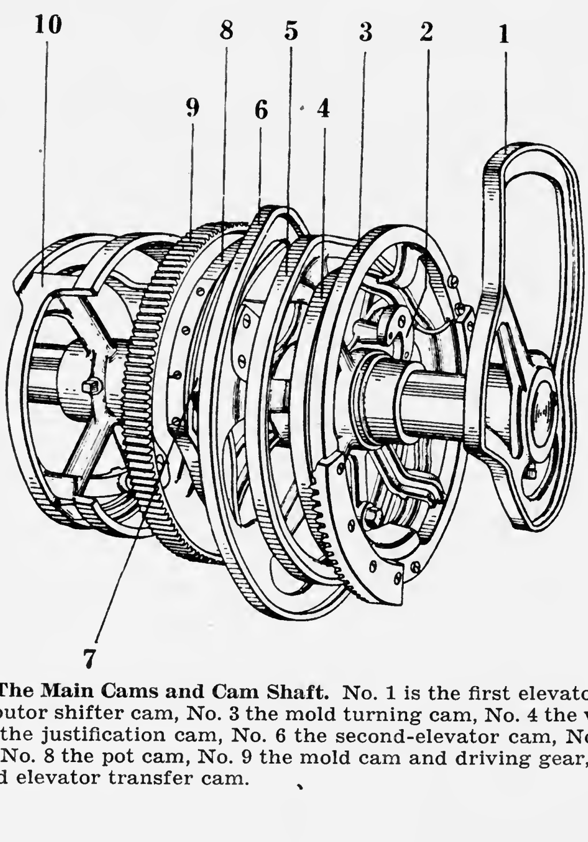


FIG. 167.—The Main Cams and Cam Shaft. No. 1 is the first elevator cam, No. 2 the distributor shifter cam, No. 3 the mold turning cam, No. 4 the vise closing cam, No. 5 the justification cam, No. 6 the second-elevator cam, No. 7 the pot pump cam, No. 8 the pot cam, No. 9 the mold cam and driving gear, No. 10 the delivery and elevator transfer cam.

causes the plunger to rise again to normal position. The front edge of the dip in the cam which permits the pump lever to descend is reinforced with a hardened steel shoe to resist the wearing action of the pump lever cam roller.

Cam No. 8.—The Pot Cam, shown at *8*, Fig. 169. Through the pot lever, this cam moves the metal pot forward so that its mouthpiece will lock tightly against the mold to make facewise alignment of the matrices. The pot is then permitted to recede slightly from the mold to permit the justification levers to drive home the spacebands. The pot cam then moves the pot mouthpiece against the mold just before the pump plunger descends to cast the slug. The pot is locked against the mold with a yielding pressure of the pot lever, which is interposed between the pot cam and the metal pot. This spring not only acts as a safety device in case of an obstruction to the action of the pot locking against the mold, but also provides a means of positively sealing the mouthpiece and mold at the time of the cast which would not be possible under any other condition. The compression crowns of the cam are fitted with hardened steel shoes to resist wear.

Cam No. 9.—The Mold Cam and Driving Gear, Figs. 73 and 101. The driving gear meshes with the driving shaft pinion mounted directly underneath, through which motion is imparted to all the cams upon the cam shaft. The mold cam is within and at one side of the driving gear and operates the mold slide, to advance the mold disk to the position at which the matrices are aligned and a slug is cast. This cam returns the mold disk after a slug has been cast and advances it again to ejecting position, finally returning it after the slug is ejected. The mold cam and driving gear also carries the pot return cam, which withdraws the pot from the mold after casting; it also carries the ejector lever cam, actuating the lever which ejects the slug from the mold.

Cam No. 10.—The Delivery Cam and Elevator Transfer Cam, Fig. 37, are cast together. The rollers on the delivery and elevator transfer levers ride against these cams with a sidewise point of engagement. After the delivery slide has conveyed a matrix line to the first elevator, the cam, through the delivery lever, returns the slide to normal position. After conveying a matrix line to the first elevator, the delivery slide is caused to start back to normal position quickly by a sudden rise in the cam.

The elevator transfer lever cam roller has a similar point of engagement with the elevator transfer cam to that of the delivery lever cam roller. The cam, through the transfer lever, operates the transfer slide finger which moves the matrix line from the first to the second elevator.

Attached to the transfer lever is the spaceband transfer lever which returns the spacebands from the transfer channel to the spaceband box. The transfer lever receives all of its motions from the elevator transfer lever through a turnbuckle connection inside the machine column.

Cam No. 10 also carries the automatic stopping and safety pawls. The automatic stopping pawl compels the clutch to be thrown out of action so as

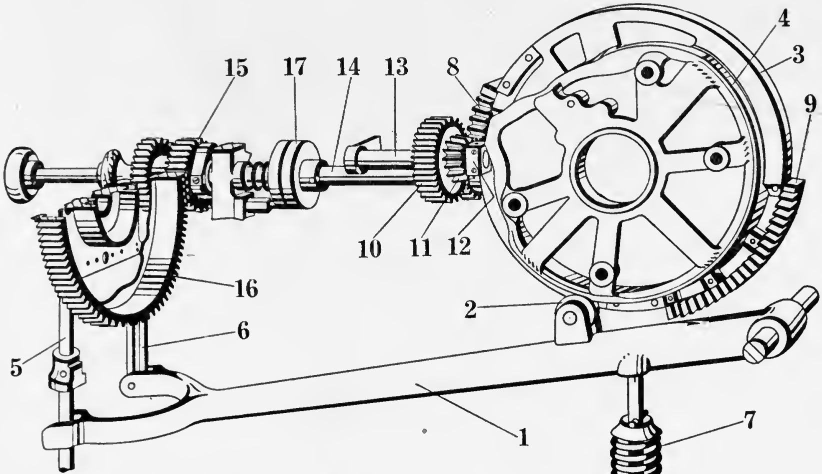


FIG. 168.—Inside View of the Mold Turning Cam (Cam No. 3) and the Vise Closing and Justification Cam (Cam No. 4). This cam has mounted upon its outer rim a short segment *8* and a long segment *9*. Through the short segment *8* this cam turns the mold in the mold disk *16*, one-quarter-revolution from normal to casting position, and by the long segment or rack *9*, through three-quarters of a revolution from casting to ejecting position.

Upon a shaft *13* inside the mold gear arm are mounted a square block *12*, a bevel pinion *11* and a spur tooth pinion *10*, which meshes with a smaller spur pinion on the mold turning shaft *14*. At the front end of the shaft *14* is fastened the mold driving pinion *15*, meshing with the teeth of the mold disk *16*.

When the short segment *8* engages the bevel pinion *11*, the mold disk is caused to turn one-quarter revolution through its connection with the spur gear *10*, which meshes with the small spur pinion on the shaft *14* and the driving pinion *15*.

The side of the cam surface against which the square block *12* rides, is cut out opposite the short and long segments, to permit the turning of the block *12* while the segments are turning the bevel pinion *11*.

The mold turning shaft brake, or friction disk *17*, at the forward end of the shaft *14* holds the mold disk *16* stationary, and prevents momentum causing the disk to overthrow, so that its locking studs will be in alignment with the stud blocks on the vise frame after the segments *8* or *9* have finished turning the mold disk to casting or ejecting position.

The arrangement of the mold disk driving pinion *15* which is outwardly movable upon the shaft *14*, but not pinned to it in the regular manner, to permit changing a mold, is explained elsewhere.

The vise closing and justification cam *4* operates the vise closing lever *1*, through contact with the cam roller *2*. This lever operates the vise closing screw at the left of the vise cap by its connection with the rod *6*, to close the left-hand vise jaw slightly before justification and opens it slightly after a slug has been cast. The justified matrix line is then lifted from the vise jaws without friction.

The justification lever *1* also operates one side of the justification block at the top of the rod *5* and assists in driving the spacebands upwards to justify the matrix line. The spring *7* constantly urges the vise closing and justification lever upwards against the cam *4* and operates the lever as the contour of the cam permits.

to stop the machine at normal position after making one revolution. The automatic safety pawl, through the same mechanism, stops the machine in case of a distributor stop, or in case anything prevents the complete transfer strokes of the first and second elevators, which on being obstructed, prevent the transfer lever cam roller from pushing the automatic safety pawl from the upper stopping lever.

A lug on cam No. 10 returns the ejector lever to normal position after the ejector has pushed a slug from the mold, through the side trimming knives and into the slug galley.

There is a pad upon the surface of the cam which depresses the second-elevator safety pawl clear of a lug on the second-elevator lever so the elevator can descend when a distributor stop does not obstruct its free descent. The safety pawl functions to hold the second elevator a short distance lower than the distributor box while a distributor stop is being cleared away. It also functions should anything momentarily hold up the second elevator and prevent its dropping down upon the transfer channel in case the machine has traveled as far as the transfer position.

Removing the Main Cams

For the reason that an unusual accident of some kind may break a cam, the following procedure is outlined for the removal of the cam shaft. Should this ever become necessary, the procedure given below will require the least amount of effort.

Before taking the cams from the machine, observe the position of the friction clutch arm, while the machine is standing at normal position. When the cam shaft is replaced, mesh the large driving gear with the driving pinion on the driving shaft so the position of the clutch arm will be the same.

Order of Procedure:—1. Remove the pot pump plunger. 2. Unscrew the pot pump spring rod and take it out. 3. Remove the locating piece fastened to the cam shaft between cams 9 and 10. 4. Loosen the set screw holding the second-elevator counterbalance weight and push the shaft toward the friction clutch until the weight can be removed. 5. Depress the justification levers and insert large spikes or small rods in the holes at the lower ends of the justification lever spring rods so that the upward pressure of the springs will be released from the cams. 6. Run the machine ahead and stop it at transfer position; remove the second-elevator lever by withdrawing the shaft. 7. Lift out the distributor shifter lever spring by passing a piece of wire through the top loop of the spring. 8. Remove the distributor shifter lever, slide and hub, by loosening the set screw holding the shaft in the bracket, and withdraw the shaft. 9. Run the machine ahead and stop it when the first elevator rests upon the vise cap. Open the vise to first position. 10. Disconnect the mold slide safety lock link from the mold cam lever. 11. Remove the mold cam lever. 12. Remove the pot pump lever. 13. Remove the screw from the pump stop bracket and lift out with the operating rod attached. 14. Take

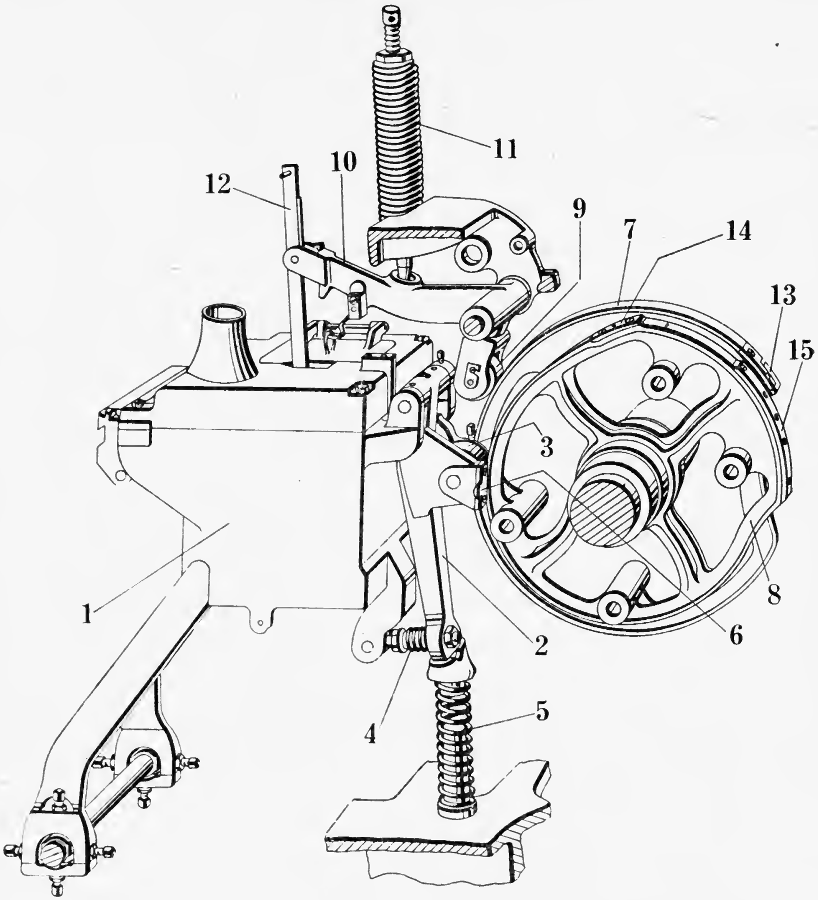


FIG. 169.—Perspective View of the Pot Cam and the Pot Pump Cam. The two cams are made in one casting. The pot cam *8* moves the pot *1* forward against the mold through its contact with the roller *3* in the pot lever *2*. The spring *4* set between the pot *1* and the pot lever *2*, provides a yielding lockup pressure of the pot mouthpiece against the mold. As the pot cam *8* revolves to move the pot toward the mold, the short shoe *14* exerts a heavy pressure of the pot mouthpiece, through the mold, against the matrices and spacebands so that all the letters on the slug will be of even height. As the short shoe *14* passes the pot lever roller *3*, the pressure of the mouthpiece against the mold is released and the pot recedes from the mold a little in order that the justification levers can drive the spacebands home and complete justification of the matrix line. The long shoe *15* then contacts with the pot lever roller *3* and locks the mouthpiece against the mold while the pot pump plunger descends to cast a slug.

After the pressure of the long shoe *15* against the roller *3* has been terminated by the revolving pot cam, immediately following the casting of a slug, the metal pot retreats from the mold as its cam permits. If, however, the mouthpiece is chilled and holds the pot in a suspended position, a small pot return cam fastened at the side of the mold cam and driving gear engages a

lug of the pot return cam shoe *6* and forces the pot mouthpiece to separate from the solidified metal in the slug base.

At *5* is shown the pot balancing spring which takes part of the weight of the pot from the pot cam.

The pot pump cam *7* supports the pot pump lever *10* by the roller *9*; the pressure of the pot pump lever spring *11* is constant. At the proper instant, the pot pump lever *10* drops down, causing the plunger through its connection by the rod *12*, to force metal through the mouthpiece into the mold. The drop of the plunger is more or less gradual for ordinary size type. For large display type there is a quick-drop attachment *13* at the front of the casting dip, so that instead of the roller riding on the cam surface, the quick drop attachment is unhooked and the roller goes over the quick drop latch, causing the plunger to come down suddenly, pushing the metal into and through the mouthpiece with greater force. It is not necessary to use this attachment when casting small type.

off the pump lever bracket. 15. Raise the first elevator by hand and put a block about six inches long under the head to hold the first-elevator lever roller from the cam. 16. Take off the first-elevator auxiliary lever. 17. Remove the first-elevator cam. 18. Lift out the ejector lever link. 19. Withdraw the shaft enough to release the ejector lever and lift out by passing it upwardly from between the cams and the justification lever shaft. 20. Remove the mold gear arm. 21. Remove the cam shaft tie rod. 22. Turn out the two cap screws and take off the motor gear guard and the right-hand cam shaft bracket cap. 23. Loosen the set screw and push the delivery and elevator transfer cam (cam No. 10) toward the other cams; then push all the cams toward the friction clutch so that while lifting out the cams, the mold turning cam will clear the distributor shifter lever spring hook. 24. Lift the cams from the machine.

After the cam shaft has been lifted from the machine, any cam can be removed by taking off the collar and turning out the four ⅝″ cam bolts, and slipping enough cams from the shaft to reach the one wanted.

Should it be necessary to remove the mold cam and driving gear, first make a mark around the shaft as closely as possible to the gear bearing to serve as a guide for location when reassembling the cams.

Before assembling the cams that have been removed from the shaft, clean them thoroughly and see that no dirt lodges between the joining surfaces.

To assemble the machine parts, reverse the above order of procedure. While placing the cam shaft in its bearings, note whether the friction clutch arm is in proper position as instructed in the second paragraph under this heading.

Care of the Main Cams

The main cams will be particularly trouble-free if given a small amount of attention regularly. The cam surfaces should be cleaned once a week with kerosene and a wiping cloth, afterwards wiping the cams dry with another cloth. The dirt, metal bits and gummy accumulations which might cause the cam rollers to slip should not be permitted to foul the cam surfaces. If the

cams are wiped clean and dry the next day after the machine has been oiled, enough of the oil will work out from the cam roller bearings to keep the cams slightly moist the balance of the week.

Keep the cams clean and never squirt oil upon the cam surfaces.

Put a little oil on the felts of the mold turning cam, pot pump cam and pot cam wipers when oiling the machine.

It is a good plan to insert the end of a wire in the oil holes of all the cam roller bearings before putting fresh oil in them, to remove the dirt which might stop the holes and cause the cam rollers to cut the cams. A dry bearing will bind the roller which may wear flat spots on its outer surface and cut the cam face.

Inspect the cam rollers regularly to see that they turn freely and are properly lubricated.

Chapter XXXII

MACHINE ACTIONS

1. A line of matrices and spacebands is assembled in the assembling elevator by the operator, through manipulation of the keyboard keys.

2. The line in the assembling elevator is raised by the operator to a point between the long and short fingers of the delivery slide.

3. The delivery slide is released as the upward movement of the assembling elevator is completed and conveys the line of matrices to the first elevator, at which time the machine automatically starts.

4. The first elevator descends, carrying the line of matrices to a position between the vise jaws and in front of the mold; the justification lever descends; the mold disk is turned to carry the mold from the vertical or ejecting position to the horizontal or casting position.

5. The mold disk moves forward toward the line of matrices, leaving a space of .010″ between the mold and vise jaws.

6. The vise closing lever rises, closing the left-hand vise jaw.

7. The justification lever rises, pushing upwardly on the justification block, which raises the long spaceband wedges and expands the matrix line against both vise jaws in preparation for final justification.

8. The justification levers descend, relieving the spacebands from the upward pressure of the justification block.

9. The vise closing lever descends, slightly opening the left vise jaw, to relieve the side pressure during alignment of the matrices.

10. The first elevator rises slightly, lifting the matrices so that their lower lugs are aligned against the shoulder of a groove in the mold face. This is called vertical alignment.

11. The metal pot advances and pushes the mold against the line of matrices. This is called facewise alignment.

12. The pot recedes, relieving the line of matrices from the pressure of the mold.

13. The vise closing lever rises, moving the left vise jaw inwardly to the exact width of the type line to be cast; at the same time the final justification of the matrix line takes place, the justification block being pushed upwardly against the long spaceband wedges to spread the matrix line to its full width.

14. The metal pot is pushed forward against the back of the mold, forcing the latter against the aligned and justified line of matrices and spacebands.

15. The pump plunger is caused to descend into the well of the metal pot crucible, forcing a stream of molten metal through the throat of the crucible, through the mouthpiece, and into the mold, thus forming the slug.

16. The metal pot and the mold retreat, drawing the slug from the matrices and spacebands. The upward pressure on the first elevator (action 10) is relieved, releasing the lugs of the matrices from the strain of alignment.

17. The mold disk stops and the pot continues to retreat, which separates the mouthpiece from the base of the slug.

18. The mold disk is turned three-quarters of a revolution, carrying the mold with the slug in it past the back knife, which trims the base of the slug; the mold stops with the slug in a vertical position in front of the trimming knives, ready to be ejected; at the same time, the first elevator rises, conveying the line of matrices to the transfer channel. The second elevator descends and positions itself upon the transfer channel.

19. The elevator transfer slide finger pushes the line of matrices into the transfer channel where the matrix teeth engage the grooves of the second-elevator bar. The transfer slide then moves back to permit the second elevator to lift the matrices from the intermediate channel, leaving the spacebands in the channel. The spacebands are returned to their box by the spaceband lever.

20. The ejector blade advances and pushes the slug from the mold, between the trimming knives and into the galley.

21. The first elevator descends to its normal position to receive another matrix line; at the same time, the second elevator is lifting the first line of matrices to the distributor box; the distributor shifter is moved outwardly to shift the matrices into the distributor box.

22. The justification lever rises slightly, actuating the slug lever, which pushes the slug into its proper position in the slug galley.

23. The ejector moves back to normal position; the distributor shifter pushes the line of matrices into the distributor box, where the matrices are lifted one by one into the distributor screws; these screws convey the matrices along the distributor bar to a point directly above their respective channels where they drop through the channel entrance into the magazine.

During actions 5 to 13, the delivery slide returns to normal position, ready to receive another line of matrices from the assembling elevator. If the operator has the second line ready before the first elevator descends after transferring the first line, he raises the assembling elevator as before, and the delivery slide automatically holds the second line in the delivery channel until the first elevator is ready to receive it. This permits the assembling elevator to be lowered so composition of the third line can be commenced.

Chapter XXXIII

ADJUSTMENTS

Twin Channel Attachment.—Adjust the keyrod lever operating lever, *12*, Fig. 5, after loosening the two binding screws, until the top of the keyrod registers equally with both lower case "e" escapements. The keyrod will then be properly set to move from one escapement to the other by the action of raising the assembling elevator.

Matrix Delivery Belt.—To be kept tight enough to run without whipping. Adjust by the idler pulley stud nut, Figs. 21, 22 and 24.

Assembler Entrance Guide Plate.—To be adjusted so that the lower edge of the plate will project over the top edge of the assembler casting and at the same time the upper edge of the plate must be a trifle lower than the bottom of the matrix channels in the magazines. Adjust with the two headless screws, Fig. 22, under holes in the plate after loosening the screws holding the assembler entrance guide to the machine face plate.

Spaceband Box.—Set the spaceband retaining block, *6*, Fig. 16, so that the end of the block will cover half of the second spaceband just before the first one is released from the banking pin. Depress the spaceband key and turn the rubber roll shafts slowly by hand until the first spaceband has advanced and is supported by the banking pin, then adjust the block to cover half the second spaceband.

Assembler Slide.—The slide finger is adjustable by a screw in the left end of the new-style slide, and a screw in the first-style slide adjusting block, so that the maximum space between the finger and the star wheel will be about a thin space less than the space between the vise jaws. Assemble a matrix line 12 or 15 ems wide with one spaceband, Figs. 31 and 32. When the spaceband is justified, the top of the long wedge should rise to a position where it will be about even with the top of the first-elevator jaws. The operator should then send in no lines which are so full as to cause the star wheel to stop revolving.

Assembler Slide Brake Operating Lever.—The adjusting screw in the eye of the assembler slide brake operating lever, Figs. 28 and 29, should be adjusted so there will about 1/64″ space between it and the brake thumb piece when the assembling elevator is raised and before the delivery slide is released. This lever through the assembling elevator, releases the brake from the assembler slide so it will return to normal position when the assembling elevator is raised to trip the delivery slide.

Assembling Elevator Counterbalance Spring.—The spring is connected at one end to a lug of the assembling elevator lever at the left side of the keyboard, and at the other end engages an adjustable screw hook in the key-

board frame. Turn the hook to regulate the spring tension so that the assembling elevator can be raised and lowered easily.

Delivery Slide Return Stroke.—When the delivery slide is returned by cam No. 10, it should travel 1/16″ past the delivery pawl. Adjust by the split arm on the delivery slide lever shaft back of the column, Fig. 37. One method of setting the return stroke of the delivery slide is to stop the machine when the high point or crown of the delivery cam (cam No. 10) has traveled opposite the roller of the delivery slide lever cam roller arm; push the roller against the cam crown after loosening the arm screws and tighten the screws slightly; then turn the machine ahead by hand until the cam crown has passed the arm roller about 1/16″, or in other words, so there will be 1/16″ space between the sloped part of the crown and the arm roller; then loosen the arm screws and tap the roller against the cam; then tighten the arm screws again. This will result in proper overmotion and position of the delivery slide on a waiting line in relation to the delivery channel.

Delivery Slide Casting Stroke.—The slide should go far enough to the left to bring the short finger 13/32″ inside the first-elevator jaws. Adjust by the screw at the extreme left side of the face plate, Fig. 37.

Delivery Slide and Automatic Stopping Pawl Plate.—The delivery slide automatically starts the machine in motion when the operator sends in a line. The plate, Fig. 163, on the automatic stopping pawl should be set out and far enough from the pawl so the roller in the delivery slide lever split arm will strike the plate and push the pawl clear of the upper stopping lever 1/64″. Before making adjustment of the plate upon the stopping pawl, check the 15/16″ adjustment of the right side of the pawl with the right side of the cam, Fig. 163, also the sidewise position of the upper stopping lever so the pawl will rest upon it ¼″ when the machine is resting in normal position, Fig. 165.

Delivery Slide Speed Regulation.—The delivery slide, when first starting should leave normal position quickly and upon approaching the delivery channel, it should slow down or cushion so that on a waiting line it will enter the delivery channel without jar. This is regulated by the vent *11*, Fig. 37, in the air cushion cylinder at the back of the machine column. If adjusting the vent does not secure control of the speed of the slide, air probably escapes from between the leather piston packing and the cylinder wall. In this case, replace the leather, or pack the old one out with muslin washers under the packing ring, to expand the leather against the inside cylinder wall.

First-Elevator Link Eyebolt and Auxiliary Lever.—Remove the link from the machine and adjust the upper eyebolt until the space between the top of the link casing and the top edge of the hole in the bolt measures ⅞″; adjust the lower eyebolt until the space between the lower edge of the link bushing and the lower edge of the hole in the eyebolt if ⅝″, Fig. 45. Return the link to position on the machine and adjust the first-elevator auxiliary lever adjusting screw while the machine is in normal position until the grooves in

the first-elevator jaw are slightly lower than the grooves in the delivery channel. The auxiliary lever adjustment is an assembling adjustment and should not be altered unless the adjusting screw has worked loose or has been tampered with. For all ordinary purposes the adjustment immediately following in the next paragraph will suffice to align the grooves.

First Elevator and Delivery Channel.—Occasionally the grooves in the first-elevator jaw may not align with the delivery channel grooves. Lift the flat tongue spring and turn the link at the bottom of the first-elevator slide until the grooves in the first-elevator jaw are slightly lower than the grooves in the delivery channel. Then release the spring.

First-Style First-Elevator Slide Gibs.—There are four gibs to support the first-elevator slide. These gibs position the slide so the elevator jaws will be parallel with the mold grooves; they also position the slide so there will be about .005″ space between the elevator jaws and the delivery channel while the machine is in normal position, and they must be positioned to permit the first elevator to descend smoothly from transfer position.

To obtain the parallel alignment of the elevator jaws with the mold, run the machine ahead until the elevator is seated upon the vise cap; open the vise jaws to 30 ems; place a new thin pi matrix, one at each end of the first-elevator jaws, disconnect the mold cam lever from the mold slide and pull the mold slide forward upon the locking stud blocks. While the first elevator is pulled up by hand, each matrix should be held snugly by the jaws. If one matrix is loose, adjust the lower gibs.

New-Style First-Elevator Slide Gibs.—The right-hand gib, is made in one long piece and is doweled to the vise frame. The left-hand gib should be set to permit .005″ play between it and the slide.

First-Elevator Downstroke or Banking Screw Adjustment.—When the first elevator banks upon the vise cap, the tops of the lower back matrix lugs should be about .010″ lower than the underside of the aligning rail in the mold groove. When the mold has advanced and the elevator rises before the cast, it forces the lower back matrix lugs upwardly against the under side of the aligning groove in the mold to align the letter characters of the matrices. The back screw *5*, Fig. 44, in the top of the slide upon which the first elevator banks should be set so there will about .010″ space between the screw and the vise cap when the elevator has been forced up for alignment. To make this adjustment correctly, send in a 30-em line containing *all new matrices,* assembled without spacebands, or a matrix line containing three or four *new and unused pi matrices* at either end. This adjustment can only be made effectively when the mold disk locking studs and the two stud blocks in the vise frame are unworn. If the studs and stud blocks are worn, the mold will be lifted up during justification of the matrix line when the justification block strikes the spacebands. Due allowance must be made if it is absolutely necessary to make the adjustment under these conditions, otherwise the advancing mold will shear the tops of the lower matrix lugs and de-

stroy their letter alignment. To determine whether the mold disk locking studs and the stud blocks are worn to the extent that there is an upward movement of the mold disk during justification of the matrix line, pry up *gently* against the teeth of the mold disk while the disk is in forward position.

It is very seldom necessary to readjust the first-elevator banking screw, and the adjustment should be thoroughly understood before attempting it.

Vise Automatic Stop Rod.—This adjustment is made by the front screw *1*, Fig. 44, in the top of the first-elevator slide; when the first elevator is resting by its banking screw (the rear one) upon the vise cap, the vise automatic stop rod adjusting screw (the front one) will depress the stop rod so the pawl will clear the advancing mold disk dog or plunger about 1/64″. To determine the condition of this adjustment, run the machine ahead and stop it as soon as the first elevator comes to rest upon the vise cap. Pull the mold slide forward by hand to observe whether the dog clears the stop rod pawl about 1/64″. This adjustment is of extreme importance. If anything (such as an overset matrix line) obstructs the full downstroke of the first elevator upon the vise cap, proper adjustment will cause the machine to stop through action of the vise automatic. See that the stop rod spring has enough tension to pull the rod up sharply when depressed by hand. Also see whether the striking edges of the rod pawl and the dog have become rounded from too frequent use.

First-Elevator Transfer Stroke.—When the first elevator rises to transfer, its position is regulated by the adjusting screw at the bottom of the slide. The adjusting screw is turned to raise or lower the position of the slide, until the teeth of a new pi matrix in the elevator jaws register with the teeth of the second-elevator bar. Matrices must be transferred from the first to the second elevator smoothly so as to prevent damage to the matrix teeth.

First-Elevator Jaw Line Stop.—The line stop is used to prevent end matrices at the left side of a line falling from the jaws while the first elevator is rising to transfer position (or while recasting from the same line), and is held from moving by a friction clamp or detent, Fig. 39. When changing from a wide to a narrow measure the line stop should be pushed inwardly. When changing from a narrow to a wide measure, no attention need be paid the line stop.

Vise Jaws.—The jaws should be set so the type face will be even with each end of the slug. The right-hand vise jaw is adjusted by the screw *8* in the top of the knife block, Fig. 53. The left-hand vise jaw is adjusted by the screw *10* in the vise closing block, Fig. 53.

Mold Slide Forward Thrust.—When the mold slide has been moved forward previous to spaceband justification and before the pot has advanced, there should be .010″ space between the mold and the vise jaws or matrix line. This will insure freedom to permit the spacebands to expand and completely justify the matrices tightly between the vise jaws. The adjustment

is made with the eccentric pin *11*, Fig. 73, in the mold cam lever. To make the adjustment, remove the first-elevator back jaw, disconnect the pot pump plunger pin; run the machine ahead until the first elevator is seated upon the vise cap and stop the machine before the mold disk has advanced toward the vise jaws; close the left-hand vise jaw; insert three or four strips of paper (one inch wide and totaling .010″ in thickness) between the vise jaws and mold; turn the machine ahead with the friction clutch arm by hand until the hardened steel shoe in the mold cam has contact with the mold cam lever roller. At this point the mold will have advanced against the strips of paper and the closed vise jaws. When the paper strips are pulled upwards by hand, there should be a slight drag. Adjust the eccentric pin in the mold cam lever until the strips pull up as described above. The eccentric adjusting pin is held in position by a jam nut which must first be loosened by the special flat end wrench furnished with the machine. This adjustment should be made with the first-elevator front jaw in position between the vise cap and vise jaws, in order to furnish a support for the jaws which are a loose fit. The object in removing the first-elevator back jaw is to make the space accessible for placing the paper strips between the vise jaws and the mold face.

Mold Cam Safety Lever.—Before this adjustment is made, check the forward thrust adjustment of the mold slide which brings the mold face within .010″ of the vise jaws; also check the 15/16″ and 1/32″ clutch adjustments. If these three adjustments are in good order, back the machine a trifle, and open the controlling lever. This is the equivalent of the machine being in action. Test the condition of the adjusting screw *17*, Fig. 76, in the forked lever which contacts with the lower end of the mold disk slide safety stop lever, by passing three or four strips of paper or a feeler gauge .010″ thick between the adjusting screw and the mold disk slide safety stop lever. This safety lever functions to shut off the machine in case anything interferes with the normal forward thrust of the mold, for example, in case the operator turns up a display mold and has neglected to slide the alignment stop bar on the vise cap to proper position.

Mold Turning Cam.—The two shoes, set in the side of the mold turning cam hold the mold disk locking studs properly in front of the stud blocks on the vise frame just after the segments have finished turning the mold disk to casting and ejecting positions and before the studs have engaged the stud blocks, Fig. 58. The adjustment of the shoes should permit as little play as possible when the square block on the bevel pinion and the shoes are in engagement with each other. The shoes are adjusted by removing the two binding screws in each shoe and turning the bushings in the cam.

First-Style Mold Driving Pinion Shaft Friction Clamp.—Adjust the screw in the clamp just enough to cause the leather lining to bind the shaft and bring the mold disk to a stop without running past the stud blocks and without chattering at casting and ejecting positions, Fig. 74. The new style friction disk or brake has no adjustment, Fig. 75.

Back Knife.—The back trimming knife should be adjusted to trim off all vent sprues and jet projections from the bottom of the slug. Adjust by the two square-head screws. Never permit the knife to press against the mold. The knife should always be set up as near the mold as possible without touching it in order to obtain type-height, which is .918″, Fig. 57.

Pump Stop Pot Block.—A number of machines, before the introduction of the new mold cam safety lever, were equipped with a pump stop pot block which functioned to prevent a downstroke of the pot pump plunger when the operator sent over a matrix line on the high alignment or duplex rail with the two-letter attachment in position, Fig. 46. The position of the block upon the pot cover is adjustable so that when the plunger is normally making its casting stroke, the pump stop lever catch block on the pot pump lever will just clear it. It has been explained that when a matrix line is on the high alignment or duplex rail in the first elevator and the two-letter attachment is swung over so the first elevator will also be held up in high alignment position, the lower back matrix lugs will be struck by the mold face and the metal pot will not make its full forward stroke in locking against the mold. The pump stop pot block on the pot cover will then not advance far enough to permit the pump lever to make its casting stroke. In this way a front squirt will be avoided.

Pump Stop.—The pump stop Fig. 100, functions when the matrix line is not fully justified or when the machine is being run idle. To make this adjustment accurately, first loosen the check nut holding the position of the adjusting nut, disconnect the pot pump plunger pin, open the vise jaws, run the machine ahead until the first justification lever (the one that operates the pump stop) is at its highest stroke, stop the machine and turn the adjusting nut until the pump stop lever is within 1/32″ of striking the stop pin in the bracket. Do not permit the pump stop lever to strike the stop pin. Correct adjustment of the nut will cause the pump stop lever to be thrown under the pot pump lever about ¼″. Tighten the check nut securely. Do not permit the pot to press against the mold any longer than necessary.

Model X Pump Stop.—As soon as the matrix line is justified, the pump stop lever should be thrown clear of the pot pump lever catch block 1/32″. Adjust by means of the screw in the forward end of the operating lever, against which the right-hand vise jaw presses to operate the pump stop lever.

Metal Pot.—The jets of the pot mouthpiece should be even with and within the constant or smooth edge of the mold body. This vertical adjustment of the pot is made by the upper screws in each pot leg, Fig. 85. The face of the mouthpiece must lock squarely against the back of the mold. Adjust with the front and back screws in the pot legs, Fig. 85. For the benefit of the inexperienced, once the pot legs have been properly adjusted, resetting will not be required except at indefinite intervals. After being used for a time, it may be necessary to dress the face of a warped mouthpiece, to bring it parallel with the mold.

Pot Lever Eyebolt.—The two nuts on the pot lever eyebolt, Fig. 78, regulate the compression and tension of the pot lever spring. The front nut should be turned up against the sleeve inside the spring. This nut regulates the tension of the spring or the pressure with which the pot will lock against the mold. The rear nut on the pot lever eyebolt should be adjusted so there will be about ⅛″ space between it and the pot lever when the pot is locked against the mold. This nut regulates the compression of the pot lever against the spring as the pot cam locks the metal pot mouthpiece against the mold. If proper adjustment of the eyebolt cannot be obtained, it may be necessary to shift the position of the sleeve. Drive out the two pins holding the sleeve to the eyebolt and after finding its new position, drill news holes to fasten the sleeve. Never discard the sleeve, as it is a safety device to permit the proper spacing between the position of the front and back nuts so the spring coils will be open the proper distance.

First-Style Knife Wiper.—The nuts at the lower end of the rod are to be set while the first elevator is resting upon the vise cap so there will be ⅛″ vertical shake in the rod, Fig. 106. The full upstroke of the wiper blade is made against the tension of the spring. Replace the rod spring if broken.

New-Style Knife Wiper.—The detent in the rod guide should have enough tension to hold the knife wiper in an elevated position after the first elevator has descended from transfer position. This is to prevent the wiper striking the ejector blade. Adjust tension of the detent with the screw at left side of the rod guide, Fig. 107. The rod spring should be replaced if broken, otherwise the knife wiper blade will not make its full upstroke to clear the knife edges of shavings.

Ejector Lever, Normal Position.—There is a screw in the ejector lever which can be turned to take up lost motion while the lever is standing at normal position, so that the ejector locating plunger will freely enter the notch in the ejector blade holder before making an ejector blade change, Fig. 101. There should be about 1/16″ play between the screw and the sleeve on the justification lever shaft.

Ejector Lever, Forward Stroke.—Adjust the screw in the ejector lever pawl until the ejector blade clears the inside slug galley 1/32″. On the new-style outside galley the screw in the ejector lever pawl should be set so the ejector blade will clear the top of the slug galley chute spring 1/32″, Fig. 101. Lowering the position of the pawl *33* will lengthen the stroke of the ejector blade.

Elevator Transfer Lever, Normal Position.—When the machine is standing at normal position, the right side of the transfer slide finger should be 5⅝″ from the left side of the transfer channel, Fig. 119. For the 42-em machine this space is 7⅝″, Fig. 120. Adjust by moving the cam roller arm upon the transfer lever shaft at the rear of the machine. The arm is clamped to the shaft with two hexagon-head cap screws.

Spaceband Transfer Lever.—The spaceband transfer lever is connected to the elevator transfer lever by a turnbuckle, Fig. 113, and moves as the transfer lever compels. While standing at normal position, the turnbuckle can be adjusted until the hooks of the spaceband transfer lever pawl go ⅛″ past the points of the spaceband box top rails. This is to insure the pawl starting the spacebands down the inclined rails of the box, from which point they slide by gravity.

Elevator Transfer Lever, First or Transfer Stroke.—When the transfer lever moves to cause the transfer slide finger to push the matrix line from the first to the second elevator, the transfer slide finger should stop even with the end of the second-elevator bar plate, Fig. 121. This adjustment is regulated by the screw in the automatic safety pawl against which the buffer in cam No. 10 strikes when the roller in the transfer lever cam roller arm causes the buffer to push the pawl clear of the upper stopping lever. The pawl banks against the rim of the cam and the adjusting screw in the safety pawl limits the first stroke of the transfer lever.

Elevator Transfer Lever, Second Stroke.—When the transfer levers come together after the second elevator has lifted the matrices from the transfer channel, to push the spacebands under the hooked end of the spaceband transfer lever pawl, there should be ⅛″ between the right side of the transfer slide finger and the bottom of the slot in the pawl. Adjust by the screw in horizontal position in the transfer finger slide, Fig. 122.

Elevator Transfer Slide Releasing Lever.—While the second elevator is seated upon the transfer channel, the screw in the second-elevator lever should depress the releasing lever, to clear the stop block on the transfer slide 1/32″, Fig. 116. Adjust by the screw in the second-elevator lever which depresses the releasing lever. In case of a distributor stop or other cause, preventing the second elevator from descending to transfer position, the releasing lever will arrest the transfer lever and stop the machine.

Transfer Bar Pawl.—There is a slight vertical freedom of the pawl in the transfer bar. While the second elevator is seated upon the transfer channel, the bar should be adjusted for height so that when the pawl is pushed upwards with a finger, the lower edge of the pawl will be even with the bottom of the second-elevator bar. Also move the bar sidewise so there will be 1/64″ between the pawl and the end of the second-elevator bar. Loosen the two hexagon-head binding screws at the front of the slide guide and turn the two adjusting screws in the top of the slide guide, afterwards holding the bar up while tightening the two binding screws, Fig. 123.

Second Elevator, Transfer Position.—When the second elevator is resting upon the transfer channel, the cam roller should clear the cam; adjust by the bolt connecting the second-elevator lever to the cam lever, Fig. 117. The spring interposed between the two levers provides a cushion impact when the second elevator seats at the distributor.

Second-Elevator Lower Guide.—The lower guide on the bracket, Fig. 123, is adjustable by loosening the binding screw in the bracket and adjusting the two headless screws which move the guide in order to position the second-elevator bar forward or backward so the bar teeth will register with the matrix teeth at the time of transfer.

All machines are now equipped with an adjustable plate, Fig. 114, on the transfer channel back plate to assist in holding the second-elevator bar plate in positive alignment. This plate should be set to permit .005″ space between it and the rear edge of the second-elevator bar plate. It will be necessary to remove the transfer channel front plate in order to turn out the two guide plate fastening screws, after which the two bushings regulating the position of the guide plate can be adjusted.

Cam Shaft Bracket Tie.—This tie rod extends from the right-hand cam shaft bracket into the column and takes the strain when the metal pot is locked against the mold. It should be turned up lightly with a wrench until the rod head bears against the bracket.

Distributor Box Matrix Lift.—The lift is to be adjusted to raise matrices above the vertical faces of the box rails 1/32″. At the time the lift makes its complete upstroke there should be 1/32″ between the underside of the matrix upper ears or lugs and the top of the distributor box rails, Fig. 131. Adjust with the screw in the cam lever, Fig. 128.

Distributor Box Lift Block.—The lift block, Fig. 128, is movable for setting the matrix lift to project under the matrix about .028″ (the thickness of an average six-point thin space) when it is at its lowest stroke and about to raise a matrix into the distributor screws. The lift is held against the lift block by a spring.

Mixer Distributor Box.—The box is independently adjustable for position at each distributor, Fig. 138, and is mounted upon a swinging arm which banks against an adjusting screw in the front distributor screw bracket for the front distributor position, and against an adjusting screw in the top screw bracket for the back distributor position. The screws which limit the stroke of the box are adjusted until a wide matrix, such as a 36 point capital "M" or "W" passes freely from the box to the lift rails. The box rests at a slight angle to the axis of the distributor screws and matrices turn to a position parallel to the distributor screws when raised to the lift rails.

Mixer Distributor Box Clutch Tripping Lever.—The normal position of the tripping lever is regulated by a screw in the font selector bracket, against which it banks, so that the block will be engaged by the block at the lower end of the clutch operating lever about 1/32″, Fig. 138. The adjustment of the normal position of the clutch tripping lever, explained above, always involves readjustment of the font selector arm feeler points, as the tripping lever is fastened to the same shaft. Altering the normal position of the tripping lever will cause the feeler points to swing through a small arc of a circle about the same distance.

Mixer Distributor Box Clutch Operating Lever.—The clutch operating lever should be set by means of the two screws in the clutch cam lever so that there will be 1/64″ space between the block at the lower end of the operating lever and the end of the block on the clutch tripping lever at the time the shifter gear cam is engaging the clutch cam lever roller, Fig. 138. This is to insure the return by gravity of the clutch tripping lever to normal position.

Mixer Distributor Box Shifter Cams.—There are two shifter gear cams, one for each position of the box at the front and back of the distributors. In some of the first mixer machines these two cams are movable in their slots in the side of the shifter gear so that while the box clutch is resting at normal (or inactive) position there will be a space of about ⅜″ between the cam and the cam lever roller, Fig. 138. Each cam, at the proper instant, according to which distributor is in use, moves the clutch operating lever away from the tripping lever in order to permit it to be free to return to normal position by gravity. After the tripping lever has assumed its normal position, and the shifter gear cam has passed the roller on the cam lever, a spring will pull the operating lever against the end of the tripping lever.

Mixer Distributor Feeler Points.—The upper and lower magazine feeler points are separately adjustable by screws at the lower end of each arm. The points must be a little in advance or to the right of the matrix lifts (viewed from the back of the machine). In this way a matrix for the upper magazine, in case the box is in lower distributor position, will bear against the feeler point and trip the clutch before the lift can raise the matrix into the back distributor screws. Adjust the back distributor feeler point first, by having the box in position at the back distributor, throw off the distributor belt, place a thin space matrix (one about .028″ thick) from the lower magazine in the box, and follow it with a lower case "m" matrix from the upper magazine. Slowly turn the distributor by hand until the lift has raised the matrix high enough to clear the top of the lower rails, when the second, or thick, matrix from the upper magazine, should trip the tripping lever by advancing against the feeler point. The tripping lever should not be thrown out of engagement with the operating lever until after the thin space matrix clears the top of the distributor box lower rail tops, and the thick matrix should trip the clutch immediately after the thin space matrix has cleared the top of the lower rail tops. The position of the feeler point is regulated by screws in the feeler arm. After the correct adjustment has been secured by the adjusting screws, back one of them about one-eighth turn away from the font selector arm center rod, so that when changing a magazine containing matrices with a different font notch, the arm will slide easily lengthwise upon the rod. This permits the sector to be changed to another notch, which controls the location of the feeler point in relation to the different selector notches cut in the lower edges of the matrices.

The adjustment of the front distributor feeler arm can now be made,

using for the first matrix a thin space about .028″ thick from the upper magazine, followed by a thick matrix, such as a lower case "m" from the lower magazine. Trip the box clutch by hand and turn the distributor until the box is in position at the front distributor. Then pass the two matrices into the distributor box and adjust the front distributor feeler in the manner just described for the back magazine feeler.

Distributor Clutch Lever Adjusting Plate.—This plate should be set to engage the channel entrance automatic stopping bar 1/32″, Fig. 155. If adjustment of the plate causes it to engage the stopping bar more than 1/32″, the channel entrance partitions will have a greater movement than necessary before the stopping bar can be disengaged from the plate which might result in springing the partitions out of line. If this occurs, it will be necessary to bend the partitions back in line again with duckbill pliers.

Distributor Clutch Lever Pawl Screw.—When the distributor is in operation and the channel entrance is closed against the magazine, the end of the clutch lever pawl screw should be 1/16″ away from the clutch flange collar, Fig. 155. A check nut holds the adjustment of the screw.

Distributor Beam, Sidewise Position.—The distributor beam is adjustable for sidewise position so that matrices dropping from the combination bar will clear the channel entrance partitions. Run several lower case "f" matrices upon the bar. As the matrices drop while turning the two-pitch distributor screws slowly by hand, they should strike the top of the channel entrance partition at the right (back view) of the channel in which they belong. While turning the first style four-pitch distributor screws by hand, the matrices should clear the top of the channel entrance partitions. When the distributor is running under power, momentum will carry the matrices toward the center of the channels into which they should drop. Adjust the sidewise position of the distributor beam with the adjusting screws at the left side of the distributor bracket, after loosening the two binding screws at the top of the bracket. These instructions apply to a machine which is running at a normal speed of six and one-half or seven lines per minute. If a motor pinion is applied in order to operate the machine at a greater speed, the position of the distributor beam will have to be adjusted accordingly.

Distributor Beam, Position for Height.—The beam is supported upon the distributor bracket by two screws. These screws should be adjusted until there is about 1/16″ space between the bottom of the matrices upon the combination bar and the tops of the channel entrance partitions. It will be necessary to loosen the two binding screws at the top of the distributor bracket, before turning the beam supporting screws.

Distributor Matrix Screw Guard.—This guard deflects matrices from the lower distributor screw into the channel entrance. The guard must not bind upon the screws nor touch the matrices while they are traveling along the combination bar. While adjusting the guard, have a pi matrix upon the com-

bination bar at either end of the distributor. Adjust for position after loosening the binding screws in the guard brackets.

Channel Entrance, Sidewise Adjustment.—Single distributor machines. The channel entrance is adjustable sidewise to align the lower ends of partitions with the magazine entrance partitions. Note that the partitions, *not the feathers,* are to be aligned with the magazine channels. The first-style means of adjusting the entrance consists of a number of very thin steel washers on the left-hand partition plate bracket screw which can be put at one side or the other of the frame lug in order to shift the entrance sidewise, Fig. 149. These washers are only intended to align the partitions with the magazine partitions and should not be used to shift the channel entrance to obtain clearance for matrices when dropping from the distributor combination bar.

The new-style means of adjusting the sidewise position of the channel entrance employs a bushing instead of washers. The bushing is pinned in a lug at the left-hand side of the frame and the hinge screws supporting the entrance passes through the bushing. The pin can be driven out after removing the hinge screw by driving inwardly when it will fall inside the bushing. The entrance can be shifted, if necessary, after removing the pin.

Channel Entrance Frame Adjustment.—Single distributor machines. Adjust the two screws in the left- and right-hand channel entrance frame brackets to position the lower end of the channel entrance partition plate 1/32″ away from the upper end of the magazine lower channel plate, Fig. 150.

Channel Entrance Open Position.—While the channel entrance is in closed position and resting upon each side of the magazine by means of the two locating fingers, there should be 1/16″ between the lugs in the left and right-hand partition plate brackets and the end of the plate stop screws at either side of the frame. These screws support the partition plate while the entrance is open and permit the locating finger to engage the magazine easily when the entrance is being closed.

Mixer Channel Entrance, Sidewise Adjustment.—Both channel entrances are independently adjustable so that the lower ends of the partitions (*not the partition springs*) will align with the magazine channel plate partitions, Fig. 153. At the left side of the channel entrance frame (back view) opposite the end of each entrance, there is an adjusting screw which regulates the position of each entrance. Loosen the binding screws in the upper magazine partition plate bar and adjust for position with the adjusting screw. The lower magazine channel entrance is adjustable for sidewise position in like manner, except that the binding screws project inwardly from the back of the channel entrance frame.

Mixer Channel Entrance, Partition Plate Adjustment.—The lower partition plate of each channel entrance rests upon screws projecting through the frame tie bar, Fig. 153, and these screws should be turned so that the lower partition plate of each channel entrance, will be even with the lower channel plate of the magazine.

Friction Driving Clutch.—When the machine is in action, there should be 15/32″ space between the driving shaft bearing and the flange. Pack out both of the clutch arm leather buffer pieces evenly with pieces of thin cardboard between the buffers and the shoes, Figs. 160 and 161.

To make a test of this adjustment, back the machine by hand a trifle and open the controlling lever. This is the equivalent of the machine being in action under power. While in this position, it should be possible to insert a gauge 15/32″ wide, made from a piece of ordinary thin steel or brass rule, between the driving shaft bearing and the flange on the driving shaft inside the right-hand cam shaft bracket.

The inside rim of the driving pulley and the clutch arm leather buffers must always be kept clean and free from oil. Oily clutch buffers will cause the clutch to slip and stall the machine.

See that the brass screws fastening the leather buffers to their shoes do not extend above the gripping surfaces of the buffers.

Never use rosin, ink, belt dressing or any other kind of dope on the clutch buffers to make them pull better. If adjustments are maintained properly, the clutch will always pull the machine through its normal movements. In addition to imposing an undue strain upon the mechanism, the use of dope on the buffers will cause the clutch to release later than it should.

Clutch Rod Spring.—The clutch rod spring normally causes the clutch buffers to grip the inside rim of the driving pulley with a pressure ranging from 16 to 20 pounds. If the clutch spring does not pull the machine steadily, it can be stretched a little by taking it out of the driving shaft after removing the end nut. The length of the spring should not exceed five inches. If the spring is stretched too much, the function of the clutch slipping in case of an accident will be defeated.

Forked Lever.—While the machine is in action there should be 1/32″ play between the flange and the forked lever. Adjust by the screw in the lower end of the upper stopping lever, Fig. 165. The lower stopping lever is merely a means of connection between the upper stopping lever and the forked lever. If the clutch fails to pull the machine around because the 1/32″ space between the flange and the forked lever does not exist, see if the 15/32″ adjustment between the driving shaft bearing and the flange is as it should be—possibly the leather buffers have become worn and need underlaying because they permit the flange to rub the forked lever. The clutch will appear to be weak when the flange binds the forked lever.

Automatic Stopping and Safety Pawls.—Set both pawls so that the right side of the pawls (standing back of the machine) will be 15/16″ from the right side of the cam. An adjusting screw in each pawl, bearing against a lug of the cam, regulates their normal position, Figs. 163 and 164. The automatic *stopping* pawl is the one that bears down on the upper stopping lever when the machine comes to a stop at normal position. The automatic *safety* pawl bears down upon the upper stopping lever and stops the machine at

transfer position when the second elevator is held up by matrices blocking the distributor.

Upper Stopping Lever.—The automatic stopping and safety pawls should rest upon the upper stopping lever ¼", Fig. 165. The upper stopping lever is adjustable sidewise by loosening the square-head set screw in the vertical starting lever bracket and turning the vertical shaft in which the upper stopping lever is mounted.

Vertical Lever, Normal Position.—The vertical lever moves only when the controlling lever is pulled to start the machine. Its normal position is regulated by a screw inside the machine column so that as either the automatic stopping or safety pawl passes it just before striking the upper stopping lever, there will be 1/64" between the upper lug of the vertical starting lever and the pawl, Fig. 165.

Vertical Starting Lever in Action.—When the machine is standing either at normal or transfer position and the controlling lever is pulled by hand to start the machine, a stud on the connecting rod engages the lower lug of the vertical starting lever and causes its upper lug to push the automatic pawl clear of the upper stopping lever 1/64". The distance the upper lug of the vertical starting lever can push the stopping and safety pawls clear of the upper stopping lever is regulated by a headless screw in the vertical starting lever bracket, Fig. 165. The person making this adjustment should observe the relation of the parts while someone holds out on the controlling lever (with the power turned off).

Chapter XXXIV

MACHINE STOPS AND CAUSES

The Intertype is built with such precision and engineering skill as to reliably serve the user with little productive interruption, provided the machine is intelligently handled.

It is conceded that troubles can and do arise in the operation of any piece of machinery. Machine stoppages will be minimized and there will be little need for consulting this list if reasonable care is exercised in cleaning, oiling and operating the machine. In other words, this compilation is intended for the use of those who do not possess proper mechanical knowledge, to enable them to recognize and remedy the faulty conditions which might occur.

Several positions of the machine are shown here in diagrammatic form, together with possible causes for the machine stopping in one of the positions illustrated. The positions of the machine at various points during one complete revolution are also named and described in the chapter dealing with the friction clutch.

In all of the diagrams, certain parts are drawn in heavy outline for easy identification, as follows:

1 represents the first-elevator slide
2 the first-elevator cam
3 the second elevator
4 the ejector lever, and
5 the metal pot.

These parts are designated because of their adaptability in explaining the various positions at which a machine may stop, by comparing their relationship when the machine stands at normal. Some of the causes given are rare, others can become commonplace because the machine does not receive the proper care each day.

As soon as the machine stalls, shut off the controlling lever, then the cause for the stoppage can be looked for with safety, both for the operator and the machine.

The Machine Fails to Automatically Start

In Fig. 170, the machine is standing at normal position. The machine fails to automatically start after the delivery slide has conveyed an assembled matrix line to the first elevator *1*.

Cause and Remedy.—With the exception of cause No. 13, the remedies for all the causes listed below are self-explanatory. The remedy can be applied after the cause of the stoppage has been determined.

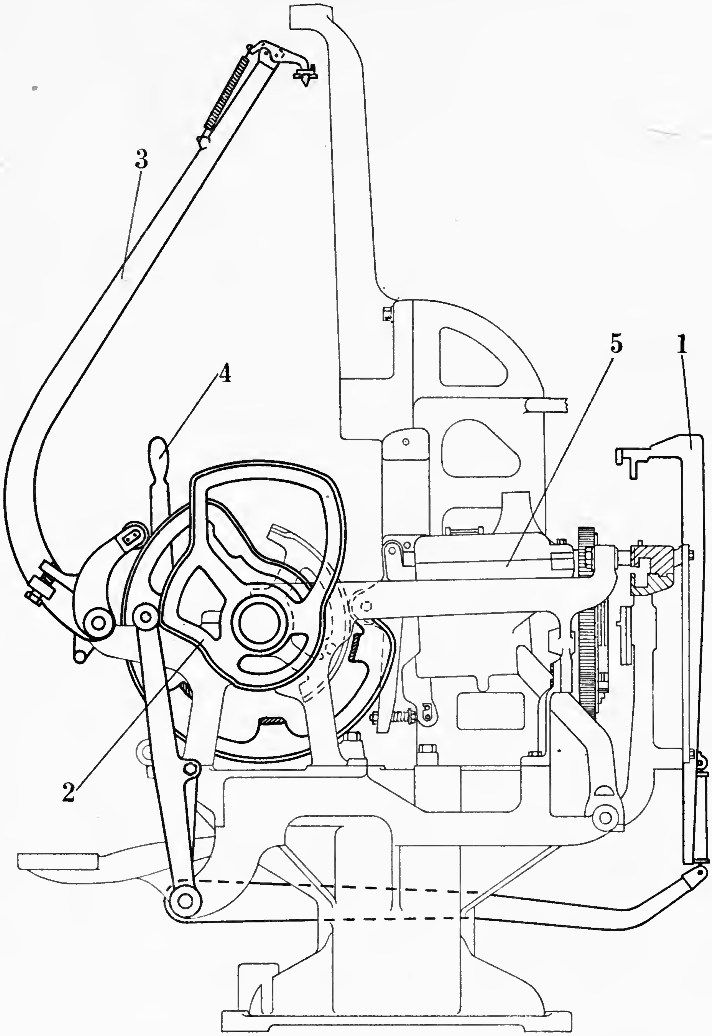


FIG. 170.—The machine is standing in normal position.

1. Matrix line may not be wholly within the first-elevator jaws, due to the operator forgetting to set the left vise jaw when changing the machine to a wider measure.

2. First-elevator jaw grooves may not be in register with the grooves in the delivery channel.

3. Too much space between the first-elevator jaws and delivery channel.

4. First style first-elevator jaw closing pin may extend into the first elevator toward the back jaw.

5. Left-hand or delivery slide long finger may be set too wide for the length of the line, permitting end matrices to twist at an angle to the rest of the line.

6. The plate on the automatic stopping pawl in the delivery and elevator transfer cam may be out of adjustment so that the delivery slide lever arm cam roller does not push the pawl clear of the upper stopping lever.

7. Delivery slide lever cam roller arm may have slipped out of adjustment on the delivery lever shaft.

8. The friction clutch flange upon the driving shaft may be bound with rust, due to lack of lubrication.

9. The clutch arm leather buffers and inside rim of the driving pulley are oily.

10. The clutch flange screw has worked out from the flange, disengaging itself from the clutch rod.

11. A matrix, spaceband or small chunk of metal may have lodged between the mold disk teeth and the teeth of the mold disk pinion.

12. The first style mold disk driving shaft friction clamp adjusting screw may be turned up too tight.

13. An ejector blade has become separated from the others in the universal ejector magazine, and extends into the mold cell. This condition of the ejector is due to extremely careless and rough treatment of the machine. In order to get at the ejector blade, proceed as follows: Disengage the mold disk driving pinion from the pin in the flange and hold it out while the controlling lever is opened to permit the seating of the first elevator upon the vise cap. Shut off the machine before the mold disk has advanced toward the vise. Push the delivery slide back to normal position by hand. Remove the matrix line by hand from the first-elevator jaws. Let the vise down to the second position to remove the mold slide from the machine, as instructed in chapter XIV, page 133. The ejector will then be accessible for repair.

Machine Stopped by the Vise Automatic or Other Causes

In Fig. 171, the machine started after the first elevator received the matrix line from the delivery slide, but stopped before the first elevator seated completely upon the vise cap, or before the mold disk has been completely advanced to casting position. The first elevator *1* has been permitted to descend by the first-elevator cam *2*, which has turned part way around in a clockwise direction.

Cause and Remedy.—1. The first elevator is held up so that the adjusting screw in the slide head cannot depress the vise automatic stop rod pawl to clear the dog which is advanced by the mold disk. The cause of the stop may be an *overset matrix line,* and the machine will operate after lifting the first elevator by hand and taking out enough matrices to permit the elevator to be seated completely upon the vise cap, or the left-hand vise jaw adjusting knob may be turned to widen the space between the vise jaws.

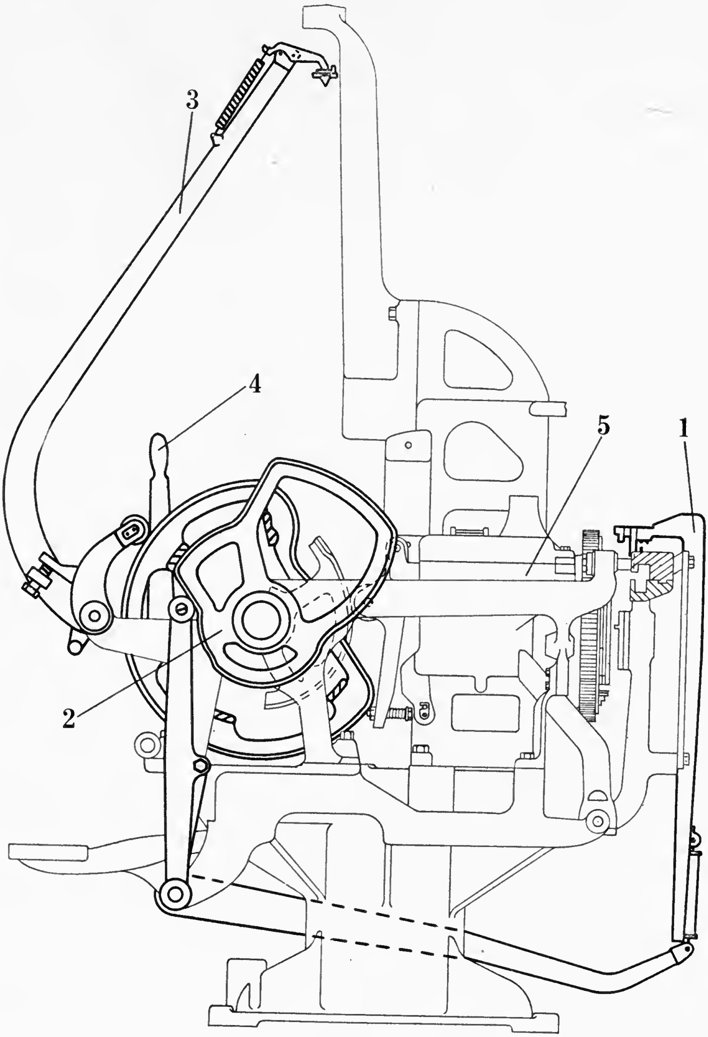


FIG. 171.—The machine has been stopped by the vise automatic or any one of several other causes.

2. The vise automatic will also function if the first elevator is held up because the knife wiper rod binds in its guides or because the rod is bent.

3. The first style knife wiper downstroke adjusting nuts may be set too high so the rod cannot be moved a little vertically when the first elevator rests upon the vise cap.

4. A defective slug which has been pulled back by the ejector blade, protrudes from the side knives and holds up the first-elevator slide through the knife wiper blade catching on the slug as the first elevator descends.

5. The first-elevator duplex rail extensions catch upon the inside edge of the vise cap, because the rail extensions have not returned to normal position after the elevator retreated from transfer position, due either to a broken rail spring or a gummy condition of the rail.

6. A loosened duplex rail cap screw may project out and obstruct descent of the first elevator.

7. If the first style first-elevator jaw closing device is on the machine, the cam on the upper right-hand slide gib may not have dropped down so as to withdraw the rod from the vise jaws while recasting.

8. The inner surfaces of the vise jaws and vise cap may be gummy and the first elevator is held in a suspended position.

9. A matrix or a spaceband may have lodged in the space between the vise jaws and the vise cap.

10. If the first-style line stop is in use, it may have worked out so as to strike the left vise jaw and obstruct the downstroke of the elevator.

11. First-elevator back jaw may be sprung or bent.

When the first elevator is resting upon the vise cap by means of the banking screw, which limits its downstroke upon the cap, the front screw in the top of the elevator slide should depress the vise automatic stop rod pawl 1/64″ to clear the dog in the vise frame when the dog is pushed forward by the mold disk. *Do not change the vise automatic adjustment unless the first-elevator downstroke banking screw fully contacts with the vise cap.*

Other Causes and Remedies.—1. Operator may have turned the mold disk to cast from another mold and neglected to re-engage the mold disk pinion with the pin in the mold driving shaft flange and the mold disk locking studs will not register with the stud blocks in the vise frame. In this case, back the machine by hand, then the mold disk pinion can be properly engaged with the pin in the flange.

2. If the machine is equipped with the first-style filling piece or "flopper," and the operator has sent in a line upon the high alignment rail (upper position) while the filling piece is in position under the first elevator, the mold will strike the lower back matrix lugs. When the machine stalls, disconnect the pot pump plunger rod pin and back the machine by hand until the mold disk is moved away from the matrix line. Throw the filling piece back, and inspect the matrix line to remove any matrices that may have been damaged by the mold.

3. The square block on the mold turning bevel pinion, due to a loose condition of the mold turning cam shoe, may bind against the shoe in such a way that the block and shoe will be out of register. Back the machine by hand and adjust the shoe.

4. The screws in the mold cam quarter turn segment are loose.

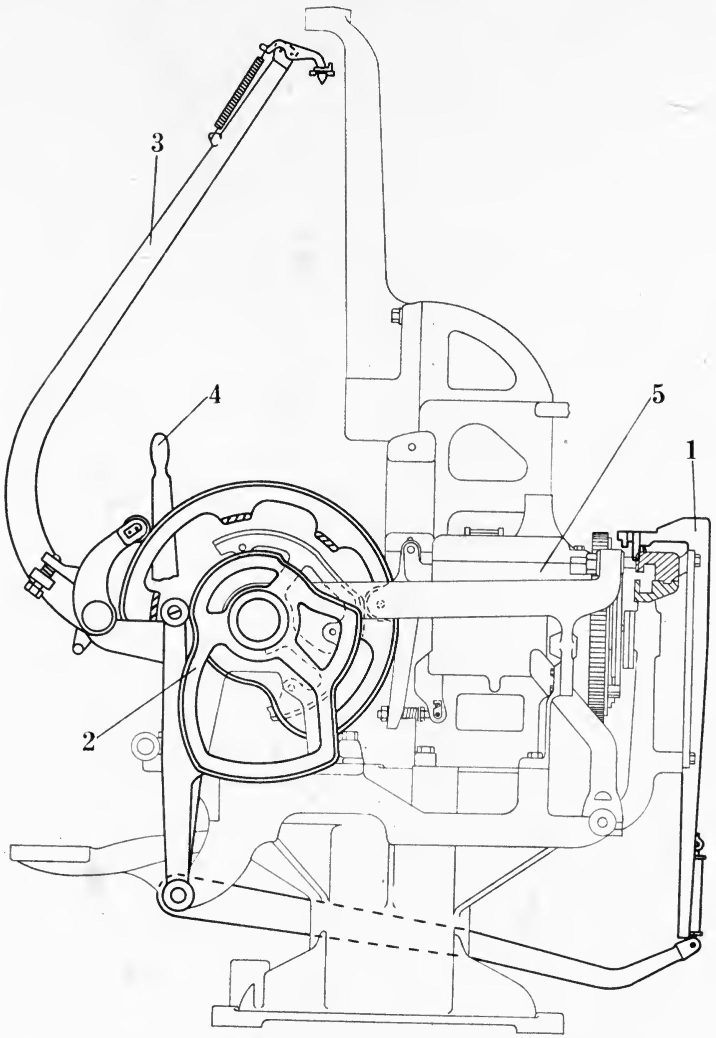


FIG. 172.—The machine has stopped in casting position.

Machine Has Stopped in Casting Position

In Fig. 172, the machine has stopped in casting position. The first elevator *1* rests upon the vise cap and the cam *2* has made one-half a revolution. The metal pot *5* has moved forward and may be locked against or has just retreated from the mold being used which is in horizontal position at the top of the mold disk.

Never permit the machine to stand in this position with the metal pot mouthpiece locked against the mold as the heat from the pot may draw the temper from the mold.

If the machine stops when the pot pump plunger is about to be raised from the bottom of the pot crucible well, release the plunger rod pin and let the machine run ahead.

Cause and Remedy.—1. **Front Squirt.**—A front squirt will stop the machine immediately after the cast if metal flows over the first-elevator jaws, the vise cap and the first-elevator back jaw support. It will be necessary to clean the squirt metal from the parts carefully and thoroughly. See that no chunks of metal remain in the mold disk or pinion teeth or the jaw aligning grooves.

2. **Back Squirt.**—This may not always cause the machine to stop, but if it does, shut off the starting and stopping lever. If the first elevator is resting upon the vise cap, lower the vise to second position. If the first elevator has risen from the vise cap, back the machine by hand until the first elevator rests upon the vise cap, then lower the vise to second position, depress the mold cam lever handle, disconnect the ejector lever link and draw mold disk forward to make the squirt accessible for cleaning. When re-engaging the mold disk with the mold driving pinion see that the punch marks register and have the mold in use located at the top of the mold disk in horizontal position.

Other Causes.—3. Friction clutch leather buffers may be greasy so that they slip.

4. Clutch flange may bind against the forked lever, due to improper adjustment of the leather buffers.

5. The clutch rod spring may be weak.

6. A piece of wire from a crucible well cleaning brush may have become wedged between the pot pump plunger and crucible well wall.

7. Pump plunger and crucible well may be dirty and cause the plunger to stick.

8. The machine may stall after the cast as the square block on the mold turning gear is about to engage the mold turning cam shoe. This will occur when the shoe has been adjusted too far out from the side of the cam.

9. If the three-quarter mold turning segment or rack upon the side of the mold turning cam is loose, trouble will be had with a smooth working of the parts when the rack engages the bevel pinion.

10. Setting up the adjusting screw too tight on the first-style mold turning shaft friction clamp may be a contributing cause for machine stoppage.

11. Motor pinion binding nut may have worked loose, causing the pinion to slip.

Machine Stopped at Transfer Position

In Fig. 173, the first-elevator cam *2* has revolved in a clockwise direction to raise the first elevator *1* to transfer position. The second elevator *3*, how-

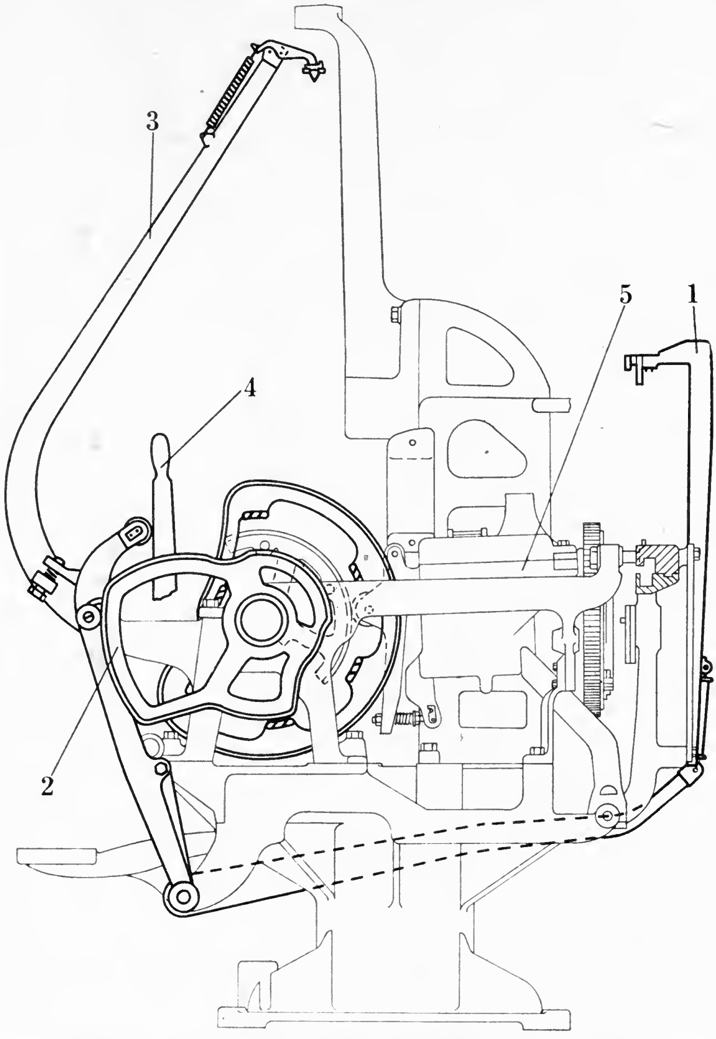


FIG. 173.—The machine has stopped at transfer position.

ever, has not descended to transfer position. The elevator transfer cam roller arm is held up because the safety lever in front of the transfer slide finger has not been depressed by the second elevator, and the automatic safety pawl in striking the upper stopping lever has thrown the friction driving clutch out of action.

Cause and Remedy

1. **Distributor Stop.**—Due to a distributor stop, matrices clog the distributor box, preventing the descent of the second elevator. Shut off the ma-

chine controlling lever and lock the spaceband transfer lever pawl by the latch at the top of the spaceband box. Go around to the distributor, clear away the cause of the stop and start the distributor. While the matrices are being lifted into the distributor screws by the box lift, hold the second elevator up in position by hand to relieve its weight from the matrices and cause the bar to align with the distributor box bar until the shifter has pushed enough matrices into the box to clear the second-elevator bar. Depress the second-elevator safety pawl inside the right-hand cam shaft bearing and lower the elevator, letting it come to rest *gently* upon the transfer channel. Grasp the lug on the spaceband transfer lever and unlock the latch so the matrix line can be transferred from the first to the second elevator. Keep the spaceband transfer lever under full control of your hand so it will not fly over. Open the controlling lever *gently* and the machine will run ahead in a normal way.

Other Causes.—2. The second-elevator bar may bind against the end of the distributor box bar.

3. A wrong font or turned matrix may be blocked by the font distinguisher.

4. The font distinguisher point may be bent.

5. Operator has neglected to shift the font distinguisher to correspond with a change of magazine.

6. Second elevator bar teeth badly worn, or the teeth on certain matrices may be worn and bind upon the bar.

7. There may be too much open space between the second-elevator bar and the distributor box bar joint.

8. Distributor box bar may be burred, because on a previous line the operator jerked open the controlling lever after having stopped the machine with the second elevator midway between the transfer channel and its seat at the distributor. This has caused the machine to start abruptly and the second-elevator bar plate has buckled, jamming against the end of the distributor box bar.

Machine Stopped at Transfer and Ejecting Position

In Fig. 174, the first-elevator cam *2* has revolved approximately three-quarters of a revolution causing the first elevator *1* to rise to transfer position, the second elevator *3* has descended to the transfer channel.

Cause and Remedy.—Observe the relationship of the parts drawn in heavy outline and identify the cause of the machine stop in one of the following classifications:

(A) First elevator fails to rise high enough to transfer position.

(B) Second elevator does not seat properly upon the transfer channel.

(C) Transfer lever strokes obstructed, due to some abnormal condition of the first or second elevators or interference with the movement of the matrix line.

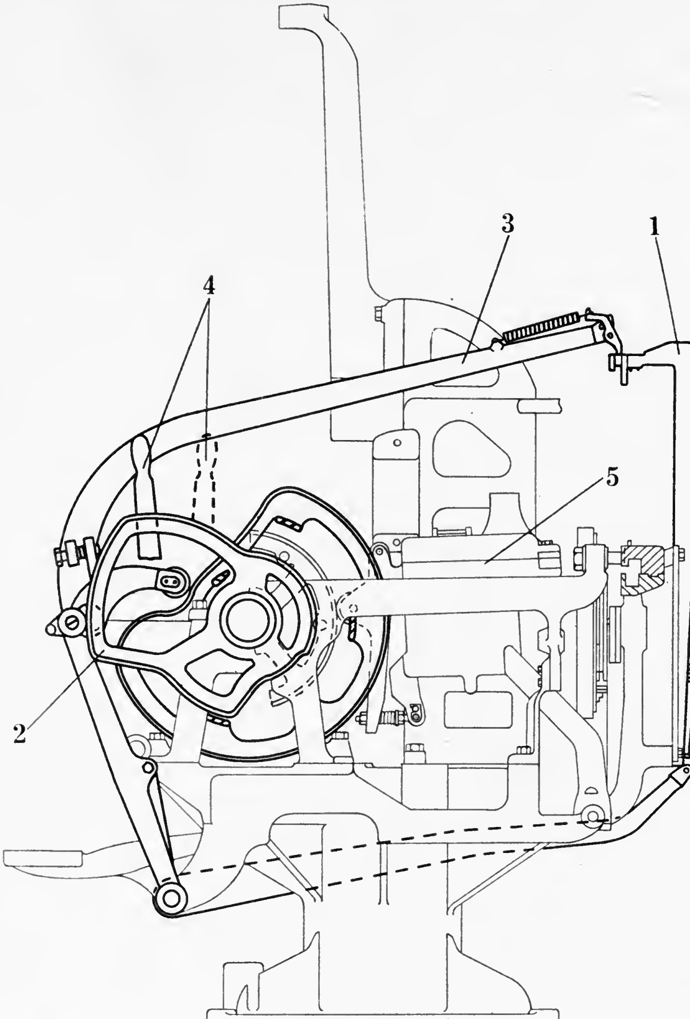


FIG. 174.—The machine has stopped at transfer and ejecting positions.

(D) Mold disk studs out of register with the stud blocks in the vise frame when the disk advances to ejecting position.

(E) Interference with ejection of the slug.

Classification A.—1. First elevator may not rise completely to transfer position because a piece of metal has lodged on top of the first-elevator slide stop adjusting screw.

2. First-elevator slide stop adjusting screw may not be properly set.

3. Elevator transfer slide finger may be buckled and holds the first elevator from rising to its seat at transfer position.

4. A piece of metal may be lodged in the matrix tooth recesses.

5. First-elevator head may be bound on the duplex rail operating bar, due to lack of proper lubrication.

6. First-elevator duplex rail may be bent or gummy, so that the operating bar in the transfer cap cannot retract the rail.

7. First-elevator slide gibs not properly adjusted to permit free upstroke of the elevator.

8. Knife wiper rod may be bent and interfere with upstroke of the elevator.

9. The safety catch at the left of the transfer cap will hold up the transfer slide finger if the first elevator does not rise completely to transfer position and this will prevent the finger moving the matrix line from the first to the second elevator. In this case the transfer lever cam roller arm roller cannot push the automatic safety pawl from the upper stopping lever, and the machine will therefore stop.

Classification B.—If the second elevator does not seat properly upon the transfer channel, the transfer levers cannot function because the adjusting screw in the second-elevator lever will fail to depress the elevator transfer slide finger releasing lever.

1. Second elevator may fail to seat in the transfer channel due to spacebands from the previous line remaining in the channel.

2. Adjusting bolt in second elevator may be set so there is no space between the cam and cam roller when the second-elevator bar plate is supposed to be seated upon the transfer channel.

3. Gummy dirt and metal accumulations in the dip of the second-elevator cam or upon the top surfaces of the transfer channel.

4. Second-elevator adjusting spring may be broken.

5. Second-elevator bar plate screws may be loose.

6. Second-elevator bar may bind upon the right-hand end of the transfer bar, due to improper adjustment of the transfer bar.

7. Second-elevator bar link hinge pin has worked loose.

8. Second-elevator bar plate angle piece binds on the transfer channel lower guide because the guide has not been lubricated.

9. Metal may be jammed between the inside rim of the mold disk and the scraper plate at the end of the mold slide. This scraper plate is intended to remove normal deposits of metal in the rim, but a back squirt may cause a considerable quantity of metal to adhere to the rim of the disk so that when the disk is revolving and has almost reached ejecting position, the machine will stall.

Classification C.—If the first and second elevators do not come to proper position at the transfer channel, the transfer levers will be held from oper-

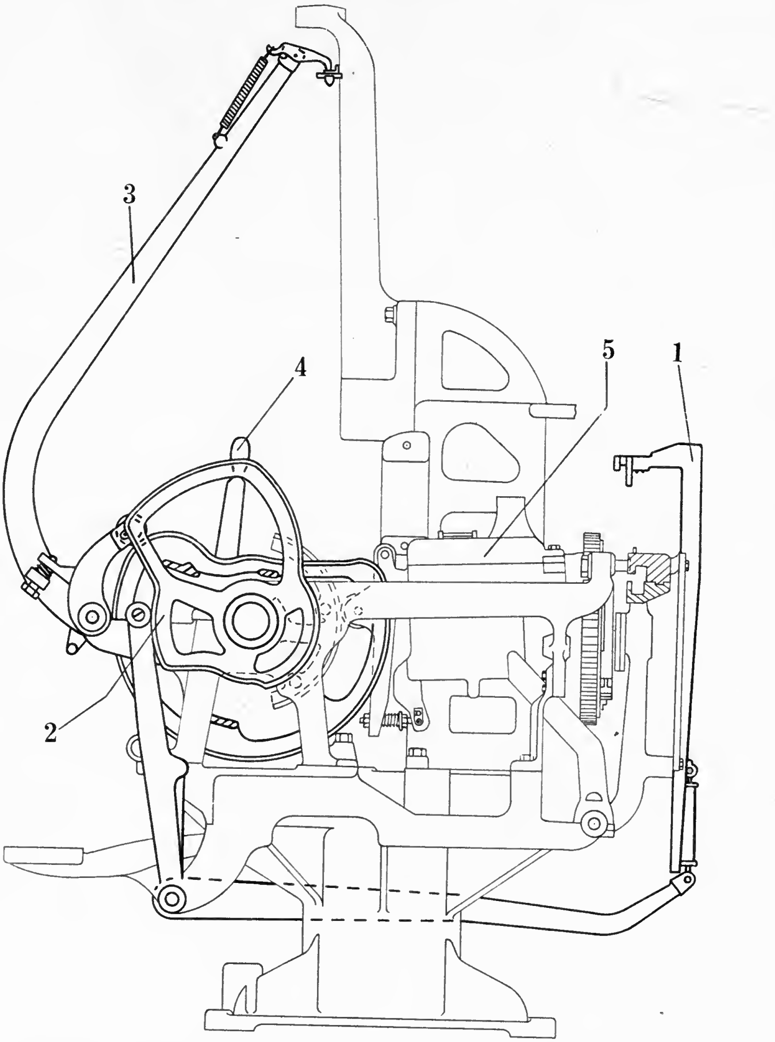


FIG. 175.—The machine has stopped between ejecting and normal positions.

ating, due to safety devices for the purpose. These levers will not function if anything interferes with the movement of the matrix line from the first to the second elevator.

1. Adjusting screw in the second-elevator lever may be set too high so that it will not depress the releasing lever to clear the block on the transfer slide finger.

2. First elevator will not lift the safety catch from the notch in the transfer finger slide if the elevator does not rise completely to transfer position.

3. The cam roller arm on the transfer lever shaft may have slipped so as to destroy the 5⅝″ adjustment and the cam roller in the arm cannot push the automatic safety pawl from the upper stopping lever.

4. Second-elevator bar may not be adjusted properly for front-and-back position. The matrix teeth bind against the end of the bar and hold up the transfer lever so as to stop the machine.

5. The transfer levers will also be held up by the matrices if the upstroke adjustment of the first-elevator slide stop screw is set too low or too high.

6. If the transfer bar is set too high or too low, or the pawl in the bar is worn, matrix teeth will strike the end of the second-elevator bar and hold up the transfer lever.

7. The transfer levers will also be held up if the first-elevator back jaw is burred or sprung or if the transfer slide finger is bent.

8. A worn spaceband transfer lever pawl guide screw may also hold up the transfer lever, and cause the machine to stop.

9. The setting of the first-elevator jaw line stop has been neglected when changing from wide to narrow measure and end matrices twist at an angle when the elevator is about to seat at transfer position.

Classification D.—1. The mold disk studs may not register with the stud blocks in the vise frame, because the first-style mold turning friction clamp may be too loose and allow the disk to chatter upon moving forward. Or the clamp may be set too tightly and prevents the disk from making the full three-quarter turn from casting to ejecting position.

2. The shoe on the mold turning cam may not be adjusted to properly engage the square block on the mold turning bevel pinion shaft.

3. On old machines, the square block on the mold turning bevel pinion may have worn a depression or hollow in the cam shoes.

4. The vise automatic stop rod pawl may not be pulled down to clear the mold disk dog, and the machine will stop in the same manner as would happen if a tight line had been the cause. Obstruction to the downstroke of the vise automatic stop rod may be caused by metal trimmings which have been permitted to pile up under the vise closing and justification lever so that the lever will fail to act on the extension of the vise automatic stop rod which engages it. On later machines, a metal chute is cast upon the mold gear arm support to deflect metal trimmings and prevent the obstruction just mentioned.

If it is found that one of the above items has stalled the machine, back the machine by hand and then clear up the faulty condition.

Classification E.—In Fig. 174, the machine is shown in ejecting position. The transfer levers have advanced to transfer the line and the ejector lever has moved from normal position to that indicated at *4*.

Obstruction to the forward stroke of the ejector blade will stop the machine, causing the friction clutch leather buffers to slip against the inside rim of the clutch pulley. This action is intentionally provided so as to prevent damage to the machine which would occur if the clutch could not slip.

1. Operator may have failed to adjust the knife block setting after changing from a small to a larger body slug.

2. Operator may have neglected to change the ejector blade setting when changing from a wide to a narrow measure slug.

3. A defective slug which has caved in when struck by the ejector blade. This may result from poor pot mouthpiece ventage, plugged mouthpiece jets, too high a metal temperature, dirty pump plunger and well, or the crucible well metal intake holes are partly closed with oxides. A defective slug may also be caused by a badly worn pump plunger and well which permit metal to escape back into the crucible when the plunger makes its downstroke.

5. The right-hand trimming knife may gouge the rib side of the slug, because of dirt or metal bits between the liners and the mold cap.

6. The nuts on the mold cap swivel bolts may not be properly tightened.

7. The mold cap may be warped.

8. The knife wiper blade may be interposed between the slug and the ejector blade, due to improper adjustment, bent rod or broken rod spring.

9. Operator may have set a dummy mold in operative position by mistake.

10. Trimming knives may be badly dulled.

11. The mold body, cap and liners may be dirty.

12. The ends of the liners may be burred and cause the slugs to be gouged or scraped during ejection. If the ends of the slug have a scraped appearance, either stone the burrs from the liners or apply new ones.

13. The friction clutch leather buffers or inside surface of the driving pulley rim may be fouled with oil or grease.

14. Metal temperature too low when casting small face, wide measure slugs.

15. Operator may have failed to put in the proper liner when changing the mold.

When the machine stalls in ejecting position, shut off the controlling lever, back the machine by hand so the ejector lever pawl can be lifted to disengage it from the ejector cam, and the ejector lever return to normal position, then back the machine again until the mold disk has retreated from the vise. Open the controlling lever and let the machine run ahead to normal position. Open the vise to first position and take out the defective slug after removing the mold cap.

Machine Stopped Between Ejecting and Normal Positions

In Fig. 175, the machine stopped between ejecting and normal positions. The first elevator *1* may be slightly above normal position and the second elevator *3* is held away from its seat at the distributor. The ejector lever *4* is

at its forward stroke after ejecting a slug and is about to be returned to normal.

Cause and Remedy.—In all probability, the ejector blade is wedged in the mold by a piece of metal which separated from the slug. This can occur by persistently running the metal at too high a temperature, neglect in occasional polishing of molds, and using damaged or nicked liners which permit type metal to adhere and collect.

Do not jerk the controlling lever or the ejector lever in an attempt to force the machine to run. Loosen the mold cap swivel bolt nuts. The knife block may have to be removed in order to get at the swivel bolts, after which the controlling lever can be opened to permit the machine to come to normal position.

Chapter XXXV

MAINTENANCE ROUTINE

Everyone who buys, uses or operates good machinery knows that it must be cared for if it is to serve as a productive unit. While the Intertype is the simplest line composing machine in the world, it is, nevertheless, a complicated mechanism. Like all precision machinery, it requires a certain amount of routine or daily attention, as well as periodical care at more widespread intervals. The machine will respond to common sense maintenance and the time allotted to give it the necessary attention will be more than offset by uninterrupted production.

If these maintenance duties are performed at stated times in an orderly manner their execution will become a very simple matter.

Usually, some person is made responsible for the good running condition of the machine or battery of machines. Where the size of the installation does not justify a full-time machinist, a brief period apart from productive time should be set aside every day for the performance of the simple duties essential to good machine maintenance.

The first and most important things to consider are the polishing of the spacebands, cleaning the pot pump plunger and crucible well every day without fail, and the avoidance of the application of too much oil to the distributor screw bearings and the back mold wiper felts.

Fifteen or twenty minutes a day for a single machine, will, as a rule, provide time enough to polish the spacebands, clean the plunger and pot crucible well, clean the mold faces, vise jaws and first-elevator jaws, clean away the metal trimmings, dust the machine, return all matrices to their proper places, and do any little repair jobs, such as a non-responding keyboard cam, a binding magazine escapement, or the changing of a spring some place about the machine.

The cleaning of a set of matrices and magazines, together with the assembler entrance will require from one and one-half to two hours; cleaning and oiling the keyboard cams, yokes and frames, according to the skill of the one doing the work will take upwards of two hours.

Every Day

Polish the spacebands upon a flat pine board with dry graphite.

Clean the plunger with a wire brush; scrape the pot crucible well, and clean the intake holes in the well.

Polish the bottom of the outside slug galley delivery chute with a pine stick and mold polish.

Polish the fronts of the molds, vise jaws and first-elevator jaws with a

clean dry cloth and dry graphite; wipe the top of the justification block and do not permit graphite to be deposited upon the block.

Brush metal trimmings from the machine.

Collect all matrices that may have accumulated in the distributor pan or upon the keyboard tray and return them to their proper magazines.

Dust the machine, especially those parts in immediate proximity to the belts.

Weekly

Oil the machine with the exception of the motor and distributor. Clean the main cams with coal oil and wipe them dry the day after the machine has been oiled. Some oil will work out upon the cam surfaces later, but a thin film of oil upon a clean cam will do no harm.

Clean the matrix delivery belt pulleys and supporting plate with a cloth and high test gasoline.

Wipe the pot mouthpiece and scratch out the cross vents lightly to remove the oxides which tend to close them. Thoroughly clean the back of the mold disk and see that no metal adheres to the backs of the molds.

Remove the graphite crusts from the back mold wiper felts with a stiff wire brush and apply mold polish if needed.

Clean the delivery slide fingers (inside), the transfer slide finger and the distributor shifter slide buffer face, with a cloth and high test gasoline.

If an electric pot is in use, polish the relay contact fingers and pole pieces in the control box with fine sandpaper. Inspect the thermostat lever contacts. The latter will not necessarily need polishing weekly, but should be inspected weekly.

Inspect the motor commutator and polish with fine sandpaper. See that the brushes are free in the brush holders.

Wipe the second-elevator head and tops of transfer channel plates where the elevator seats during transfer. If the Mixer is in use, apply a thin film of oil to the top of the second-elevator bar plate after cleaning.

Go over the machine and tighten screws that might have worked loose. A new machine should be inspected frequently for a time. The screws holding the long and short segments to the mold turning cam, the ejector lever cam screw, the set screws for the pot pump lever and mold cam lever shafts, and the pot leg adjusting screw nuts, should be particularly watched.

Inspect the cam rollers to see that they are turning freely.

Examine the distributor conveyor screws for oil that may have worked out upon the threads. The oil, if permitted to remain upon the screws, will foul the lugs of matrices and cause them to stick in the magazine.

Every Two Weeks

Oil the distributor bearings.

Oil the motor.

Oil the knife block.

Oil the assembling elevator gate roll and hinge pin sparingly and apply the oil with a wire or toothpick; oil the delivery slide releasing pawl, the adjusting rod spring, and the lever link back of the face plate; oil the transfer lever link, the spaceband transfer lever pawl and turnbuckle; oil the distributor shifter lever link; apply some grease to the assembler slide bell hammer where it is engaged by the hammer trip.

Loosen the pot lever shaft set screw and rock the shaft several times with a screwdriver inserted in the hole in the end of the shaft. If the shaft moves stiffly apply coal oil, then lubricate with machine oil. The new-style pot lever shaft can be tested in this way, but before doing so, note the position of the lever between the pot jacket lugs and see that the lever does not bind between the cams.

Once a Month

Refill the grease cups.

Inspect assembling elevator front rail fibre buffer, and replace if a depression has become worn in the top edge.

Every Three Months

Remove mold cooling oil separator cylinder from the mold cooling equipment and wash the steel wool free from dirt and oil, by immersing in gasoline.

Remove the pot and mouthpiece burners if gas is used to heat the metal. Use a stiff wire brush to clean the burners and wipe out the burner orifices underneath the pot.

Clean the front and back keyboard cams, rubber rolls and frames. *Lubricate the cam pivots with clock oil only.*

Clean magazines and matrices. These need not be attended to at one time, but the cleaning process can be spread over a period of several weeks.

Remove the pot lever, wash and clean the rollers in coal oil and apply new hard grease.

Yearly

Remove the entire keyboard from the machine, and clean all the parts, including the keyrods and frame. Depending upon conditions in the room, once a year is sufficient, although in some plants this operation may be necessary every six months.

Chapter XXXVI

OILING THE INTERTYPE

It is impossible to give absolutely definite instructions as to how often each part of the machine should be oiled or how much oil should be used. The essential point is to keep all bearings and working surfaces sufficiently lubricated at all times, without allowing any surplus lubricant to remain on the machine and collect dirt. Carry the oil can in one hand and a wiping cloth in the other, and wipe off all dirt and surplus oil as the work progresses. Wiping the parts and preventing excess oil are the two important items in caring for an Intertype.

For all parts requiring oil, excepting the keyboard cams, use a medium grade of good mineral oil. The oil and grease sold by the Intertype Corporation is recommended.

Keep all cam and roller surfaces free from dirt, to insure the turning of the rollers.

Do not put oil or any other lubricant on the matrices or in the magazines, or in any path through which the matrices and spacebands pass.

The art in oiling the machine is to see that all parts get the oil required and yet avoid applying an excess that may escape from the region which it is intended to lubricate. It should be remembered that there is considerable heat around the metal pot and the amount of oil applied to the parts to which this heat will be transferred should be regulated so that matrices will not be fouled by traveling oil.

Use an oil can which can be controlled, that is, the amount of oil escaping from the end of the spout. If too much is let out at one time, a little solder applied to the tip and then drilled out with a very small drill will provide a means of controlling the flow so that one drop at a time will be ejected from the spout.

Do not promiscuously fill an oil cup just because it has a cover and is packed with wicking. Wicking is put in the cup to permit oil to drain slowly. However, in most cases, two or three drops of oil weekly is all that is required.

Some systematic method should be followed in oiling the various parts. The following list contains the points of lubrication for a single distributor machine, commencing at the left side and working around the machine. Any other systematic method of locating the points of lubrication would be equally as good.

Parts to be lubricated with oil.	Number of holes or surfaces.
Vise closing screw and bushing	1
Mold turning bevel pinion shaft	2
Mold turning shaft bearings	2
Justification lever roller	1
Vise closing and justification lever roller	1
Pot pump lever shaft bearing	2
Pot pump lever roller	1
Pot lever roller	2
Mold slide cam lever shaft bearing	2
Pump stop lever bearings and rod bearings	3
Mold slide bearing*	See foot note
Distributor shifter lever shaft bearings	2
First-elevator auxiliary lever roller	1
Ejector lever pawl	1
Ejector lever link wing pin	1
Second-elevator lever roller	2
Second-elevator lever shaft bearings	2
Main cam shaft	2
Justification lever shaft bearings	2
Justification lever bearings	2
First-elevator lever and ejector lever shaft bearings	2
Driving shaft	2
Driving pulley	1
Mold slide cam lever rollers	2
Spaceband transfer lever shaft rear bearing	1
Delivery lever shaft rear bearing	1
Elevator transfer lever shaft rear bearing	1
Intermediate shaft	2
Keyboard rubber roll shafts (one drop in each bearing)	4
The pi stacker pulleys	4
Assembler drive idle pulleys	2
Assembling elevator lever bearings	2
Assembling elevator gate roller	1
Assembler shaft and idle pulley	2
Matrix delivery belt idle pulley	1
Spaceband transfer lever shaft front bearing	1
Spaceband transfer lever turnbuckle wing pins	2
Delivery lever shaft front bearing	1
Elevator transfer lever shaft front bearing	1
First-elevator slide and gibs	2

***Mold Slide Bearing.**—There is a cup above the mold slide to the right of the metal pot. While it is all right to apply small quantities of oil to this cup, it is better to ignore the cup entirely and once a week rub a thin film of oil on the mold slide bearings with the fingers when the slide is pulled out. This manner of lubrication will prevent excess oil from the cup flowing into the ejector parts and fouling the matrices.

Parts to be lubricated with oil.	**Number of holes or surfaces.**
First-elevator lever link wing pins	2
Slug lever connecting rod	1
Metal pot leg bushings	2
Universal ejector shifter lever bearings	2
Vise automatic stop mold disk dog	1
Mold disk guide	1
Mold slide	4
Justification rod bearings in vise	4
Mold disk locking stud blocks	2
Mold disk stud	1
Magazine frame wing pin (Equipment B)	4
Magazine cradle frame shaft (lower) shoes (Equipments C and D only)	2
Magazine frame bearings	2
The motor armature shaft	2
Distributor box matrix lift lever bearings	2
Distributor box matrix lift lever cam roller	1
Distributor conveyor screws	6
Distributor clutch lever	1
Distributor clutch shaft	1
Distributor clutch	1

Distributor Screws.—Apply one drop of oil to each distributor screw bearing once in two weeks. These bearings are not called upon to do very heavy duty and the screws merely propel their own weight in the bearings. If too much oil is applied to the screw bearings, it may work out into the screw threads and foul matrices which will then fail to drop freely from the magazine.

Assembler Bearings.—Be cautious as to the amount of oil that is applied to the assembler bearings. One small drop weekly will be sufficient in each assembler bearing. Too much oil, especially in the star wheel shaft bearing, will cause matrices to become gummy.

Front and Back Mold Wiper Felts.—The front mold wiper should not have anything rubbed into the felts other than gasoline and graphite. When giving the back mold wiper attention, apply only enough lubricant (which is usually of a greasy nature) to keep the wiper working efficiently for a week. The heat generated by the molds will cause the lubricant to become thin and if there is an excess, it will flow to the front of the mold and foul matrices.

Keyboard Cam Lubrication.—Remove the keyboard as instructed in the section of the book dealing with keyboard care. After washing the cams, apply very little clock oil (with toothpick or match) to the bearing only. Use a good grade of clock oil. An excessive amount of oil will be transferred to the rubber rolls from the cams and cause them to rot.

Inspect the Motor Bearings.—See that the rings are revolving and well lubricated and fill the oil well as required. Once every two weeks will be suf-

ficient, although the motor commutator and brushes should be inspected weekly.

See that the mold turning cam shoe, the pot pump and the pot cam wiper felts are supplied with oil.

Rub a little oil on the second-elevator guides, upper and lower, also on the inside of the delivery lever air cylinder.

With Medium Cup Grease.—Turn the cap of the driving gear or pulley grease cup slightly each week. Apply grease to the distributor shifter cam, the pot return cam and the ejector cam. Magazine cradle frame shaft (lower) shoes on Equipments C and D should have a little grease.

With Dry Graphite.—Apply graphite weekly to the delivery slide channel, the elevator transfer slide channel and the distributor shifter slide channel. Clean the channels thoroughly and apply the graphite sparingly.

Chapter XXXVII

MAKING OPERATING CHANGES

It is well to become accustomed to making machine changes in a certain definite order. Even experts are liable to forget something unless the same routine is so invariably followed that it becomes a habit. The order suggested below can be altered if desired, but whatever order is adopted should be followed every time a change is made.

It must not be assumed, because there are several details to attend to in making a complete change, that such a change is a difficult matter or that it requires considerable time. Even on a single-magazine Intertype most changes can be made in a very few minutes, and on multiple magazine machines even less time is required. The simplicity and ease of Intertype changes are important advantages of the Better Machine.

Mold, Liner and Ejector.—Don't forget to change the ejector. Whenever changing a mold or a liner, always change the ejector blade or check which blade is set. In this way, damage to liners will not occur, because of a forgotten ejector blade.

To Change the Body (Thickness) of the Slug, without changing the measure (width) and without changing the matrices, it is only necessary to change the mold liners and right trimming knife.

To Change the Measure (Width) of the Slug, without changing the body (thickness) and without changing the matrices, it is only necessary to change the mold liner, ejector, assembler slide, delivery slide long finger, left vise jaw and the line stop. If only a few lines are required, change only the assembler slide, delivery slide, left vise jaw and the line stop, and then cut off the blank ends of the slugs in a power saw-trimmer or an ordinary lead-and-rule cutter.

To Make a Complete Change of face, body and measure, it is necessary to make all of the following changes:

1. Mold liner and ejector blade. (Make these two changes together.)
2. Assembler slide.
3. Delivery slide long finger.
4. Knife block.
5. Line stop.
6. Left vise jaw.
7. Font distinguisher.
8. Magazine and matrices.

Change Mold Liners.—If a mold carrying liners for the body and measure desired is already in the disk, it is only necessary to turn the disk around until the proper mold is in operating position. If it is desired to change the

liners, lower the vise to first position, turn the mold disk around until the mold is in casting position, loosen the two nuts on the swivel bolts at the ends of the mold cap, swing back the swivel bolts, lift the mold cap on the prongs of the special wrench furnished for the purpose and take out the liners; put in liners of the size required (constant or right-hand liners have two holes), replace the mold cap, and turn the mold around into operating position. Always tighten the swivel bolt nuts to a snug fit only—not too tightly. See that the liners, mold body and cap are clean and free from bits of metal before putting them on the mold body. Occasionally, polish the mold body and cap to insure easy ejection of the slugs and a good lockup of the mold and the pot mouthpiece. If the mold wipers are kept in good condition accumulations of metal on the molds will be minimized.

Change Ejector.—To change the universal ejector, push down on the locating lever under the mold slide shifter lever dial, move the shifter lever until the required length of blade is indicated by the dial and release the locating lever which will return to its former position to lock the setting. See that the locating lever engages properly by shaking the shifter lever, otherwise the ejector will not operate and the machine will stop at the point of ejection.

Change Assembler Slide.—To change the length of the line, merely press the finger piece on the adjusting block, and move the block until the indicator registers with the desired mark on the scale.

Change Delivery Slide Long Finger.—To change the measure, first lift the detent on the delivery slide long finger block, move the block until the right side of the long finger corresponds to the measure wanted as indicated by the assembling elevator gate em scale, then release the detent.

Change the Knife Block.—To change the knife block, simply lift the locking detent which engages the transverse grooves in the rim of the dial and revolve the dial until the proper body size is indicated by the scale, then release the detent to lock the setting of the knife.

Change Line Stop.—Set the line stop in the first-elevator jaws to the measure or width of slug to be cast.

Change Left Vise Jaw.—To set the vise jaw for the desired measure or width of slug, pull out the adjusting knob at the left of the vise cap and turn it until the measure required is indicated by the scale on the indicator rod and release the knob which will then spring back into position.

Font Distinguisher.—On Equipments A, B, C, D and Model X fit the operating lever into the proper notch in the indicator plate, according to the point size of the matrices to be used. On E machines, change the font selector sector in the selector block under the distributor box.

Magazine or Matrices

Equipment A.—If the matrices required are in an extra magazine, open the channel entrance and tilt the magazine frame back and down as far as

it will go. Slightly lift the magazine and permit it to slide down the frame, after which it can be removed. Slide the extra magazine into position, release the latch which holds the magazine frame in tilted position, push the frame up into operating position, and close the channel entrance. If the matrices required are not in an extra magazine, it will be necessary to run them out and place them on a matrix tray. After making sure that the magazine is empty and clean, run in the font required by sliding the matrices a few at a time on the teeth of the second-elevator bar, inside the distributor shifter slide with all the reference marks facing toward the front of the machine. Some operators prefer to run in a font by placing the matrices, 30 ems at a time in the assembling elevator and sending them through in the usual way. If this is done, the pin should be disconnected from the pot pump plunger rod.

Equipments B and C.—To change from one magazine to another on B and C machines, throw back the channel entrance, turn the magazine shift lever until the desired magazine is in operating position, and close the channel entrance. Magazines are removed and replaced on the B and C in exactly the same way as described above for the A machine, but see that the top magazine is in operating position before attempting to tilt the frame backwardly.

Equipment D.—To change from one magazine to another on Equipment D, throw back the channel entrance, turn the magazine shift lever until the desired magazine is in operating position, and close the channel entrance. If it is desired to change the split magazine, simply lift it off and replace with another split magazine. Full length magazines are removed and replaced on the D machine in exactly the same way as described above for the A machine, but see that the top magazine is in operating position before attempting to tilt the frame backwardly.

Equipment E.—To change from one magazine to another, move the magazine shift lever above and at the right of the keyboard. Either magazine can be removed from the machine by first throwing the channel entrance auxiliary stop, lower the channel entrance until it rests upon the stop, then lower the magazine frame until it rests against its stop in the distributor bracket.

Chapter XXXVIII

SUPPLIES

Be sure that your orders are signed and contain definite information with all the data necessary to fill them correctly. Orders are delayed daily because they are unsigned or because they do not specify exactly what is required. For instance, customers order "One 8 point liner," without mentioning the width of slug to be cast; "Matrix border slide No. 134," without mentioning the width desired; "One font of Century Expanded with Century Bold," without specifying the size; "Sorts matrices of the following characters," without giving either the size or face with which they are to be used. Such omissions often cause expensive and embarrassing delays, which can be prevented only by care on the part of those who write the orders.

If it is necessary to telegraph for supplies, please send the telegram as early in the day as possible, so that it will be received by us in time to insure shipment the same day.

Order by part letter, number and name, and give special number of your machine.

Use the printed supply order blanks which are furnished without charge upon request. Forward your order to the Intertype branch in your territory so that you may be supplied in the shortest possible time.

Be sure to specify how your order is to be shipped—by mail, parcel post, express or freight. We will insure all packages valued at $1.00 or more, when sent by parcel post, unless advised to the contrary.

Protection Supplies

The following machine parts in addition to certain tools, are furnished gratis with new machines simply as a measure of protection for the customer. These parts should always be kept on hand.

2	Assembler stars	T - 61
1	Assembling elevator matrix detaining plate (front)	T -1339
1	Assembling elevator matrix detaining plate (back)	T - 122
1	Keyboard cam and yoke assembled and bearing	T - 418
6	Escapements (1 of each size)	T - 707
1	Knife wiper (not assembled)	U - 32
1	Pot gas burner tip (No. 57 hole)	U - 131
1	Distributor box bar point	V - 493
1	Elevator transfer slide finger	V - 588
1	Intermediate bar pawl	V - 104
1	Spaceband lever pawl spring	W- 141
2	Assembling elevator gate spring screws	W- 410

6	Assembling elevator lever link screws (upper)	W- 412
3	Assembling elevator em scale screws	W- 414
3	Distributor box back plate lower rail screws	W- 421
7	Distributor box front plate lower rail screws	W- 422
8	Assembling elevator latch spring screws	W- 423
1	Galley channel screw	W- 434
1	Distributor box front plate brace screw	W- 489
7	Assembling elevator matrix buffer front and back screws	W- 551
1	Assembler driving belt	W- 720
6	Escapement lever springs	W- 897
6	Keyboard rod slide springs	W- 915
1	Motor pinion (if machine is equipped with geared motor)	S - 114
1	Mold cap swivel bolt	U - 214
1	Mold cap swivel bolt nut	W- 376
1	Vise automatic dog spring	W- 144
1	Thermostat wire (when mach. is equipped with electric metal pot)	W-1847
1	Knife wiper bar spring	W- 124
1	First-elevator jaw pawl spring	U -1389
1	First-elevator jaw pawl	U -1391
1	Magazine shutter operating lever spring hook	W- 647

The quantity of supplies kept on hand should be regulated by the number of machines in use and the conditions under which the machines are operated.

In most cases, in addition to the above list furnished with a new machine, it is well to keep on hand an extra pair of side trimming knives and a back knife for use while dull ones are being ground at the nearest agency, extra keyboard rubber rolls, pot lever spring, pot lever anti-friction rolls, assembling elevator fibre buffers, front and back keyboard cam stop strips and a few channel entrance partitions.

The judgment of the user of the machine should dictate as to what is to be carried for protective purposes.

How to Order Matrices

We want to fill your orders promptly and correctly without having to write you for further necessary information. Therefore, please read these instructions carefully and save delay to all concerned. Send all matrix orders to the nearest Intertype Branch office.

Use Order Blanks.—Write all orders on printed matrix order blanks. We furnish on request, without charge, separate blanks for use in ordering English, German, Russian and Hebrew faces; also accents, special characters and borders. Be sure to supply all the information called for on the order blank, and do not forget to sign it.

Size, Name of Face and Number.—State clearly the size, name of face and font number desired. When ordering sorts, if you do not know the size,

number or name of the face you are using, send a lower case "f" matrix with your order. Any sample matrices will be returned with shipment.

Method of Shipment.—Please specify how the order is to be shipped, whether by parcel post, express, freight or otherwise. We will insure all packages valued at $1.00 or more, when sent by parcel post, unless advised to the contrary.

Matrices for Intertype Machines.—Be sure to specify the kind of magazine for which matrices are desired, indicating as follows: 90-channel, 72-channel, side-magazine Nos. 1, 1a, 2 or 3. It is also very essential to state the kind of keyboard layout with which the matrices are to be used. Specify mixer notch number if matrices are to run in machines with equipments E or E-s.m. 3.

Matrix Capacity of Intertype Magazines.—The channel entrances of Intertype magazines are variably spaced. This permits the free use of large faces. For instance, an 18 point cap W of normal width will run in an Intertype magazine. This is also true of the lower case "m" and "w" in 24-point normal faces when cut to run in cap side of magazine. Spaces, leaders and dashes up to 221 thousandths of an inch will run in the regular channels of Intertype magazines.

Leaders.—Always state what kind of leaders are desired: One (.) and two (..), two (..) and four (....) or three (...) and six (......) round dots. One (_) and two (__), two (_) and four (____) or three (___) and six (______) hyphen leaders. In the absence of specific directions we will furnish one (.) and two (..) round dot leaders.

Figures.—When ordering old style faces, specify whether old style figures (1 2 3 4 5 6 7 8 9 0), modernized old style figures (1 2 3 4 5 6 7 8 9 0), or modern figures (1 2 3 4 5 6 7 8 9 0) are desired. *If no specific directions are furnished* OLD STYLE *figures will be supplied.* When ordering special figures of any kind, state whether they are to run in the magazine or as sorts.

Fractions.—Em-set fractions (⅛ ¼ ⅜ ½ ⅝ ¾ ⅞) are supplied with all fonts unless en-set fractions are specified. En-set fractions (⅛ ¼ ⅜ ½ ⅝ ¾ ⅞) can be furnished for nearly all fonts, and will be sent in place of regular em-set fractions, if desired, without extra charge. Unless otherwise specified, all fractions will be furnished to run as sorts. Upon request and without extra charge they will be cut to run in the magazine according to regular keyboard layout No. 2, or in special channels. The following is the standard arrangement for regular fractions: ⅛ in ffi channel, ¼ in ffl channel, ⅜ in ? channel, ½ in * channel, ⅝ in Z channel, ¾ in ℔ channel, ⅞ in & channel.

Head-Letter Matrices.—Head-letter matrices can be used on any Intertype, and on all other slug-casting machines equipped with a universal knife block. They can be furnished to run as sorts or in the magazine channels according to various keyboard layouts. When ordering, be sure to specify how the matrices are to run. If in the magazine, state the keyboard layout desired.

Broken Fonts.—Whenever substitutions or changes from our regular font schemes are required, we will make an extra labor charge for each font. When ordering fonts of caps or lower case only, specify whether a to z are desired or a to z, figures and points. Specify quantity of individual characters required if lower case only is wanted. Unless advised to the contrary, we will send a to z only. Such fonts will be charged for at regular sorts prices.

Special Characters.—Consult our special character order blank (Form 131) for a list of characters which can be furnished for nearly all faces. Some special characters which we have not yet manufactured will be made on request and furnished at regular prices; others will be made only at special prices. Be sure to have on hand a pad of special character matrix order blanks, and order by number and body size desired. Customers requiring matrices bearing a special design should write for quotations, submitting a clear sketch or sample of what is wanted. When ordering special characters, specify whether they are to run as sorts or in the magazine. If in the magazine, state the channel in which each character is to run.

Keyboard Layouts.—Many Intertype keyboard layouts are the same as those used on other machines for the various languages, and for the different English combinations—both one-letter and two-letter, with and without fractions, advertising figures, head-letter faces, etc. A diagram of any standard keyboard desired will be mailed on request.

Logotypes.—Ordinary logotypes, composed of two or more matrices fastened together, will be supplied at regular sorts prices plus an additional labor charge for each two picas width or fraction thereof. Write for quotation.

Other Languages.—We can supply matrices, including all the necessary accents, for 32 languages. *Accent matrices for any language not regularly manufactured by us will be made on request.*

When ordering matrices for other languages, specify the channel in which each accent is to run.

Chapter XXXIX

INSTALLING THE MACHINE

Any competent line composing machine machinist can install an Intertype, but it is not recommended that a novice undertake the work, even with the help of the following suggestions, unless thoroughly familiar with machinery in general. This statement is made only because it is important that the work be done right, not because the machine is extremely complicated or its erection a very difficult matter. Many Intertype purchasers have erected their own machines, without previous experience, but such an undertaking is not generally recommended.

Preliminary Suggestions

If the Intertype Corporation is to erect the machine, telegraph or telephone to the General Offices, or to your local Agency, immediately upon its arrival. Have the machine taken to your shop, and determine where you wish to have it placed. If possible, locate the machine in a well lighted and well ventilated place, giving due regard to necessary working space and to the other factors mentioned below.

Floor Space.—The net floor space occupied by a single machine is about 25 square feet—5′ x 5′. The overall floor space, including working space and chair space for the operator, should be at least 76 square feet—9′ 6″ front to rear and 8′ wide. In the case of a row of machines side by side, allow at least 6′ 8″ width for each machine. Allow 2′ extra for machines equipped with the side magazine unit. In any case, allow as much room for working space as is conveniently possible.

Door Width.—A minimum door width of 3′ 6½″ is required to permit the passage of the largest of the mechanisms as shipped. A width of 2′ is sufficient if the machine is completely stripped down, but this entails considerable extra expense and loss of time.

Foundation.—The net weight of Equipment A is 2550 pounds; the B, 2595 pounds; the C, 2645 pounds; the E, 2710 pounds. The weight of the side magazine unit is about 500 pounds. The floor under the machine can be of wood or concrete, but should be level, smooth, free from vibration, and capable of supporting a load of 150 pounds per square foot. If necessary, the floor can be strengthened by additional posts beneath, or lay another floor of 2″ planks over the first and crosswise of the joists. A wooden floor can be covered with sheet zinc or iron, if desired.

Concrete Floors

When Intertypes are placed on a concrete floor there is liability of trouble from the fine dustlike particles that are constantly wearing off the surface

of the concrete unless the floor is protected in some way. Concrete dust is full of minute crystals of silicate from the crushed stone. These crystals have sharp edges and are very injurious to fine machinery.

Provision should be made in some way against conditions of this sort. There are a number of dressings or solutions that can be used to paint concrete floors, not only to eliminate dust that will eventually injure machinery but to provide a cleaner and more healthy composing room.

Power.—The source of power must be capable of giving a uniform speed of 66 revolutions per minute to the driving pulley or gear wheel. In the case of individual motor drive, it is advisable, where possible, to bring all wiring through the floor in conduit, making connection to the motor or motor bracket. Each motor should have a separate circuit and fuse cut-out, and all wiring should be of a size to carry without heating 25% above the normal current rating as stamped on the motor. Electrical equipment must conform in all respects with the code of the National Board of Fire Underwriters and with local statutes.

Gas Heater.—If gas is to be used, be sure that your line gas meter is of sufficient capacity for the number of machines to be installed, allowing 15 cubic feet of gas per hour for each machine. The piping should, if possible, be run through the floor, and the following sizes should be used; for one machine, ½″; two machines ¾″; three machines 1″; six machines 1½″; twelve machines 2″. Outlets to each machine from the main supply line should be ⅜″ pipe. It is advisable to place a drip cock at the lowest point of the line where the pipe exceeds 1″ diameter, especially if there is a possibility of freezing.

Gasoline Heater.—(First Style Burner.) If gasoline is to be used for heating, the gasoline tank should be of at least one gallon capacity and provided with a shut-off valve. The tank can be located in any convenient place, if possible about 10 feet from the machine and about 8 feet above the level of the burner. The tank should be connected with the burner by a ¼″ or ⅛″ pipe, and this pipe should have a shut-off valve at any convenient point near the burner. The Intertype gasoline heater has a mouthpiece burner as well as a main burner. Complete instructions for operating the first style burner will be sent on request.

The Reliance Gasoline Burner equipment is now furnished instead of the first style gravity feed type burner. This burner has proven to be the most satisfactory design obtainable and is recommended wherever gas or electricity is not available. Complete instructions for installing and operating the Reliance burner equipment are furnished with orders.

Electric Heater.—If electricity is to be used, the equipment should be installed and connected according to the manufacturer's specifications. Due regard must be given to the requirements of the Board of Fire Underwriters and to local statutes. When the pipe or conduit is brought through the floor and connected to the machine, there should be at least 2 feet of pipe between

such connection and the nearest elbow or junction box. A clearance of ½″ around the pipe is advisable.

For detailed information concerning electric metal pot, see chapter XVI.

Ventilation.—It is well to provide for proper ventilation by installing a hood over the metal pot of the machine, to carry away any fumes that may be generated by the gas or gasoline heater. No fumes are given off by the molten metal. A ventilating hood may consist of a 2″ pipe with a 3″ flare over the metal pot chimney, the pipe running to any convenient outlet. For a single machine such provisions are usually considered unnecessary. The electric metal pot does not require the installation of ventilating apparatus.

Unpacking

Read the following instructions before starting to erect the machine.

Remove all grease from cams, mold, disk, vise frames, and all other surfaces where it has been used. This grease or petroleum distillate is put on only to prevent rusting. It is *not* a lubricant and will gum up if not removed.

If possible, move the large packing case into the position of erection before opening it. First remove the cover and take out the distributor bracket and step. Then remove the sides and skids and place the base of the machine in the position desired.

Unpack the other cases, keeping small parts together and cleaning all grease or paint from the bearing surfaces.

After you have made sure that all bearing surfaces are clean, and that any burrs caused by damage in transit have been removed, you are ready to proceed with the erection of the machine.

Assembling the Machine

The following procedure is for Equipments A, B, C and D; although most of the instructions will also apply to the "E" (Mixer) machine.

Apply the intermediate bracket.

Apply the distributor bracket.

Apply the distributor bracket tie.

Apply the back step.

Apply the motor bracket and switch.

Remove the switch box cover. Fasten the box to the base of the machine near the starting lever, with the screws supplied for that purpose. Replace the switch box cover and handle.

Cut the wires holding the vise frame and front levers. Remove the safety pin banking screws and apply the locking screws to the vise frame, turning them in until the shoulder is almost, but not quite even with the stud banking surface (never beyond). Re-insert safety pin banking screws.

Apply the magazine frame and cradle and magazine shutter fingers. In the case of Equipments C and D, apply a little grease to the magazine cradle frame shaft (lower) shoes.

Place the assembler driving belt on the assembler driving pulley; lift the face plate nearly into position; twist the assembler belt once and place it on the assembler pulley; locate the face plate by means of the dowel pins and draw it gradually to its seat with the bolts supplied for this purpose.

Place the keyboard in position and start the large bolts; tighten the bolt in the intermediate bracket, and then tighten the large bolts; then loosen the bolt in the intermediate bracket and again tighten it (this to prevent springing of the bracket).

Apply the matrix tray.

Apply the channel entrance frame bracket.

If the machine is a B or a C, apply the channel entrance frame.

Apply the channel entrance operating lever.

Apply the channel entrance operating lever connecting link.

Apply the first-elevator cam, with the hub and set screw on the inside toward the bearing.

Apply the first-elevator auxiliary lever. Lift the first elevator lever, if necessary, to properly apply this part.

Apply the metal pan.

Apply the pi stacker bracket.

Apply the pi stacker.

Apply the pi stacker to bracket.

Apply the pi chute.

Apply the sorts tray bracket.

Apply the sorts tray.

Apply the copy hooks.

Apply the assembling elevator operating lever and connect it with the assembling elevator.

Insert the spaceband keyboard rod and connect it with the spaceband box operating lever.

Apply the assembler entrance and stationary front guide.

Apply the assembler chute spring. This can best be adjusted after the machine is in operation.

Apply the assembler front cover.

To remove and clean the distributor bar, release and lift the back distributor screw, loosen the bolts holding the bar, tip the bar forward slightly and remove it, being careful not to injure the distributor screws or the combination on the bar. Clean the bar with gasoline or benzine and replace it, also the back screw, and bring into correct position by the timing pin on the gear.

Release the safety pawl and back the machine until the second-elevator lever descends part way; open the channel entrance, place the distributor in position, and bolt it securely to its seat.

Apply the distributor box.

Apply the distributor shifter lever.

Apply the distributor shifter and connecting link.

Apply the font distinguisher.

Apply the second elevator.

Take off the left-hand first-elevator slide gibs, which will be found turned outward. Do not touch the right-hand gibs, as they are adjusted to align the elevator. Place the first-elevator slide in position. Replace the gibs and connect the link to the first-elevator lever, turning the eye-bolt if necessary until the first-elevator jaw and the delivery channel are in line.

Apply the elevator transfer slide.

Connect the delivery slide lever and the delivery slide with the delivery lever link.

Apply the electric light holder.

Put on the main driving belt, keyboard belt, and pi stacker belt.

Put on the distributor belt and cross it once.

Place the motor on its bracket; mesh the pinion with the driving gear, allowing paper clearance—.003″ to .004″—between the motor driving gear and the motor pinion; then bolt the motor to the bracket.

In case of a two- or three-magazine machine (with the channel entrance open and the cradle in such position that the top magazine would be in operation), pull down the magazine cradle, put on the magazines, return the cradle to operative position, and close the channel entrance.

Starting

Make the electric, gas, or gasoline connections, and light the burners.

Oil the machine at the proper points, and when the metal in the pot is melted turn the machine over once by hand before starting it under power.

The machine may turn over hard when new, but if it sticks do not try to force movement; locate the trouble and remedy it before proceeding further.

When satisfied that everything is correct, turn on the power and permit the machine to turn over several times before running matrices into the magazines.

See that the motor pinion is meshed properly with the driving gear, that the motor armature turns freely and the bearings are filled with oil before starting.

Withdraw the keyboard locking wires (the *upper* wire on each side of the center of the end of the keyboard).

Run matrices into the magazine or magazines and begin composition.

Chapter XL

MISCELLANEOUS

Some Notes.—Never flood the machine with oil. Always carry an absorbent wiping cloth with the oil can and remove all surplus oil as you go along. The cups do not need to be filled, just put in a few drops of oil.

Oil or graphite should never be put in the magazine. Keep it absolutely clean.

Move the channel entrance *gently* when closing it, but always open it quickly in case of a distributor stop to prevent matrices falling from the channel entrance into the magazine.

Magazine escapements never need oil.

Keep your temper. If a matrix fails to respond, don't try to loosen it by pounding the magazine or the keybutton.

If the machine stalls, shut off the controlling lever, then locate the trouble and remedy it.

The back distributor screws should never be raised when there are matrices on the combination bar, as it is sometimes difficult to return the screw to place with the matrix lugs between the screw threads.

The level of the metal in the crucible should not be permitted to sink below the top of the well. On the other hand, do not allow the metal to go higher than within one-half inch of the top of the crucible.

Never feed slugs into the metal pot. They should be melted in a metal furnace in as large quantities as possible, the metal skimmed and cast into pigs. The heat of the metal in the furnace can be about fifty degrees in excess of the temperature required in the metal pot, or approximately 600 degrees. Information regarding metal furnaces and their use will be sent upon request by the Intertype Corporation.

Overheating the metal in the machine metal pot causes imperfect slugs and hastens rapid deterioration of the metal. Keep the temperature in the neighborhood of 550 degrees. Test the temperature occasionally with a thermometer.

Never force the first elevator down into the vise cap when the matrix line is so tight that the elevator will not descend far enough to release the vise automatic. If this advice is disregarded, matrices will be ruined and a metal squirt may occur. Damage to the first-elevator jaws might also result.

Never leave the machine in such a position that the metal pot mouthpiece is pressed against the mold. The mold will surely be warped from the heat.

If the clutch slips, first see if the leathers are oily. Also look to the 1/32″ space between the forked lever and collar. It is not necessary to stretch the clutch spring except at very long intervals.

The spaceband transfer lever pawl should be locked before lowering the second elevator by hand to the transfer channel after clearing away a distributor stop.

The lugs of matrices can be cleaned by rubbing them on a board or felt, but the sides should be cleaned with a soft cloth.

Polish the spacebands every eight-hour run, by rubbing them on a smooth pine board, over which is sprinkled Dixon's No. 635 graphite.

Never clean matrices with gasoline. This liquid causes type metal and dirt to stick tenaciously to brass.

If a matrix stalls the distributor screws by catching at the lift, throw off the distributor belt and back the distributor a trifle by hand to release the matrix.

Never use the ejector lever to pound a stuck slug from the mold. If a slug sticks in the mold or the side knives, back the machine a trifle by hand and raise the ejector lever pawl to release the ejector, then permit the machine to run ahead to normal position. The slug may be taken out after removing the mold cap. Pounding out stuck slugs injures the ejector blades and damages the mold. Avoid stuck slugs by keeping the metal in the pot at the right level.

Clean the plunger, the well and the metal intake holes in the well daily.

Avoid excess lubricant on the back mold wiper felts, the assembler and distributor screw bearings.

Hints For Operators

It is not feasible to give a course in machine operation in this book, but a few important suggestions will be of value.

The art in operating an Intertype keyboard to obtain maximum production lies in successively touching the key buttons evenly and smoothly so that matrices will come to rest in the assembling elevator in their proper sequence. Consistent practice and faithful application of the principles of a touch system will bring this about.

It is not necessary to watch the keyboard keys after having mastered a touch system of operating, as the fingers will automatically locate the keys. The eye will be free to watch the copy and the assembler. Nervous and physical energy will thus be conserved for the important task of concentration upon the copy being set. After a time, the operator will develop a sixth sense which will enable him to detect the failure of a matrix to properly respond to the keyboard touch.

If a touch system of operating has been adopted, the operator while working on straight matter, can assemble matrices so rapidly that alterations may be made in the line, or the line can be thin-spaced without always interrupting the continuous operation of the machine.

The Intertype Corporation is interested in the fingering methods used in operating its machines. We strongly urge our customers to see that their

operators adopt a scientific operating system, for the reason that the correct fingering of a keyboard has become a highly specialized vocation. There are a number of schools devoted to this purpose. The Intertype Corporation maintains a school for its customers in Brooklyn, in which is taught a scientific method of operating the keyboard.

Endeavor to Operate Evenly.—Control the movements of the fingers so that the intervals between the dropping of matrices will be evenly timed. If a matrix fails to respond, do not impatiently pound the key button. Identify the cause of non-response and eliminate it. Nothing can be gained by losing your temper and pounding the key button or the magazine, besides, you might spring the magazine top plate. For causes of non-response of matrix see page 20.

Proper Spacing of Matrix Lines.—A good operator always fills out the matrix line as much as possible and avoids crowding more matrices into a line than will freely go in. If necessary, insert thin spaces between the words to fill out the line. It is just as easy to thin-space lines correctly on an Intertype as it is when setting type by hand. Any spacing effect may be obtained by the use of suitable spacebands which are made in various thicknesses for all kinds of composition.

Neatness About the Keyboard.—The beginner should acquire neat and orderly habits about the keyboard. Keep all the spacebands in their proper place in the spaceband box. Do not let them fall to the floor or accumulate upon the keyboard tray. A small receptacle, called a pi box, is furnished with the machine and is intended to be used for depositing portions of an overset matrix line or a wrong matrix. It is, however, only intended as a convenience and a temporary repository for a few matrices. Keep all the matrices in their respective magazines.

Changing Magazines.—Before making a change of magazine see that all matrices belonging to the magazine about to be changed have been removed from the keyboard and have cleared the distributor bar. In this way the annoyance of wrong fonts will be obviated.

Transpositions.—If transpositions occur in proofs, make sure that the fault is not due to careless slurring of the key buttons. Then consult the list of causes for transpositions on page 22 of this book.

Pot Crucible Metal Level.—It is important that the metal level be maintained as high and constant as possible to insure solid body and good face slugs. When the metal is permitted to run low, the plunger is apt to become coated with excess dross, porous slugs will be cast and metal squirts may occur. The thermostat which controls the temperature of the metal is not as accurate in operation when the metal level in the crucible is low. All of these annoyances seriously affect the quality of the output and cut down machine production. The level of the metal should be maintained close to one-half inch from the top of the crucible casting. It is extremely desirable, where metal pots are fed by hand, that one pig at a time be put in the crucible at

regular intervals. Replenishing the metal supply with several pigs at one time will cause the temperature to drop to such an extent that the chilled metal may cause the mouthpiece jets to become clogged which will result in imperfect type faces and slugs.

Avoid Handling Matrices and Spacebands as much as possible. Some operators' hands perspire freely and this moisture will be transferred to the matrices and spacebands as well as the keyboard key buttons. Frequent washings with ordinary household cleaning ammonia will keep the key buttons clean.

Distributor Stops.—If the distributor stops frequently, consult the causes therefor in the chapter pertaining to the distributor. When opening the channel entrance pull it towards you gently until about one-half inch away from the magazine, then open it quickly. This will prevent matrices sliding flatwise into the magazine. After the matrix causing the distributor to stop has been cleared away, close the channel entrance *gently.*

Estimating Manuscript

Words Per Thousand Ems

Size Type	Solid	1 pt. Leads	2 pt. Leads
5 point	220	175	130
6 point	240	200	160
7 point	260	220	180
8 point	280	245	210
9 point	300	265	235
10 point	320	290	255
11 point	330	300	270
12 point	340	310	285

Words to the Square Inch

Size Type	Leaded*	Solid	Size Type	Leaded*	Solid
5 point	50	69	10 point	16	21
6 point	34	47	11 point	14	17
7 point	27	38	12 point	11	14
8 point	23	32	14 point	—	11
9 point	21	28	18 point	—	7

*Leaded with 2 point leads.

How to Measure Composition

By the Inch

1. Multiply the length of the column (or columns) in inches by the width of the line in pica ems.

2. Multiply the result by the proper figure in the following table (according to the size of face):

5 point 34.56	6 point 24.	8 point 13.5	10 point 8.64	12 point 6.
5½ point 28.54	7 point 17.63	9 point 10.67	11 point 7.15	14 point 4.41

Example: To find number of ems in 176 inches of 8 point, 26½ ems wide:

$$176 \times 26.5 \times 13.5 = 62{,}964 \text{ ems}$$

By the Line

1. Multiply the number of lines by the width of line in pica ems.
2. Multiply the result by the proper figure in the following table (according to the size of face):

5 point 2.4	6 point 2.	8 point 1.5	10 point 1.2	12 point 1.
5½ point 2.18	7 point 1.71	9 point 1.33	11 point 1.09	14 point .86

Example: To find number of ems in 1684 lines of 6 point, 14 ems wide:

$$1684 \times 14 \times 2 = 47{,}152 \text{ ems}$$

Book Work Measurement

	21 ems			23 ems			25 ems		
	Ems per line	Lines in 1,000 ems	Inches in 1,000 ems	Ems per line	Lines in 1,000 ems	Inches in 1,000 ems	Ems per line	Lines in 1,000 ems	Inches in 1,000 ems
6 point	42	24	2	46	21⅔	1¾	50	20	1⅔
8 point	31½	32¼	3½	35	28⅝	3¼	37½	26½	3
10 point	25¼	39½	5½	27⅝	36	5	30	33⅓	5⅝
11 point	23	43½	6¾	25	40	6⅛	27¼	36¾	5⅝
12 point	21	48	8	23	43½	7¼	25	40	6⅔

Newspaper Measurement

13 Ems Pica	5½	6	7	8	9	10
Number inches in 1,000 ems .	2⅔	3¼	4⅜	5⅔	7¼	9
Number ems in line	28⅔	26	22¼	19½	17⅓	15½
Number lines in 1,000 ems ...	35⅓	38½	45	51⅓	57⅔	64½

Number ems in a 22-inch column—5½ point, 7,900; 6 point, 6,785; 7 point, 4,970; 8 point, 3,865; 9 point, 3,050; 10 point, 2,520.

Weight of Intertype Slugs

Size of Slug	Slugs in 1 lb.	Slugs in 100 lbs.
6 point 13 ems solid	19 1-2	1950
6 point 13 ems on 7 point	17	1700
6 point 13 ems on 8 point	15	1500
8 point 13 ems solid	15	1500
8 point 13 ems on 9 point	13	1300
8 point 13 ems on 10 point	12	1200
10 point 13 ems	12	1200
10 point 22 ems	7 1-4	725
10 point 30 ems	5 1-2	550
11 point 13 ems	11 1-2	1150
11 point 22 ems	6 1-2	650
11 point 30 ems	5	500
12 point 13 ems	10	1000
12 point 22 ems	6	600
12 point 30 ems	4 1-4	425

Size of Slug	Slugs in 1 lb.	Slugs in 100 lbs.
6 point 42 ems	6 2-5	640
8 point 42 ems	4 4-7	457
10 point 42 ems	3 1-2	350
12 point 42 ems	3 1-5	320
36 point 42 ems	1 7-16	210 2-3

It is sometimes desirable to know the amount of metal in a certain piece of composition where it is not convenient to weigh the slugs themselves. The following table is computed on the weight of solid slugs, so allowance will have to be made if recessed mold is used.

Size of Slug	Pounds per 1,000 ems	Ems per pound
6 point	2.00	500
6 point on 7 point slug	2.27	440
6 point on 8 point slug	2.56	390
8 point	3.50	285
8 point on 9 point slug	3.92	255
8 point on 10 point slug	4.35	230
10 point	5.40	185
11 point	6.45	155
12 point	7.70	130

6 and 8 point are calculated for 13-em slugs. 10 point and larger on a 21-em slug. Longer slugs weigh less to the thousand ems and shorter slugs more though the difference is too small to count in any calculation in which the above table would be useful, as it can never be more than an approximation. About 3½ square inches weigh one pound, a trifle less for 6 point, a small fraction of an inch more for 12 point; two-sevenths of a pound to the square inch will give the weight of a page of matter if you have the size of the page in inches.

Decimal Point Measurement of Point Sizes

Point		Point	
1	.01383	18	.249
2	.0277	20	.2766
3	.0415	22	.3044
4	.0553	24	.332
4½	.0622	26	.3596
5	.0692	28	.3874
5½	.0761	30	.415
6	.083	32	.4428
7	.0968	34	.4703
8	.1107	36	.498
9	.1245	40	.5532
10	.1383	42	.581
11	.1522	48	.664
12	.166	54	.747
13	.1798	60	.830
14	.1937	66	.913
15	.2075	72	.996
16	.2214		

Decimal point measurement of slugs, .014 to a point.

Names of Point Sizes

Excelsior	3 point
Brilliant	3½ point
Diamond	4½ point
Pearl	5 point
Agate	5½ point
Nonpareil	6 point
Minion	7 point
Brevier	8 point
Bourgeois	9 point
Long Primer	10 point
Small Pica	11 point
Pica	12 point
English	14 point

Point System

The Point System adopted by typecasting machine manufacturers is on the basis of .01388 to the point, setwise, or .1666 to the pica. Accordingly 6 ems are exactly one inch long.

YOUR INTERTYPE IS YOUR PARTNER—TREAT IT WELL

1. Test the ejector blade setting after each change of mold or liners.
2. Keep oil away from matrices and magazines.
3. Oil the distributor screw bearings sparingly every two weeks.
4. Keep all of the main cam surfaces *clean.* A thin film of oil working out from the bearings upon the cam surfaces after cleaning is beneficial.
5. Oil the machine thoroughly each week, with the exception of the distributor and motor.
6. Clean the pot pump plunger and scrape the pot crucible well daily; open the intake holes in the well; wipe the pot mouthpiece.
7. Polish the spacebands with dry graphite every eight hours.
8. Do not change the adjustments unless it is absolutely necessary.
9. Leave the machine at normal position—*always.*

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